School Shop

vol. VII no. 9
MAY, 1948

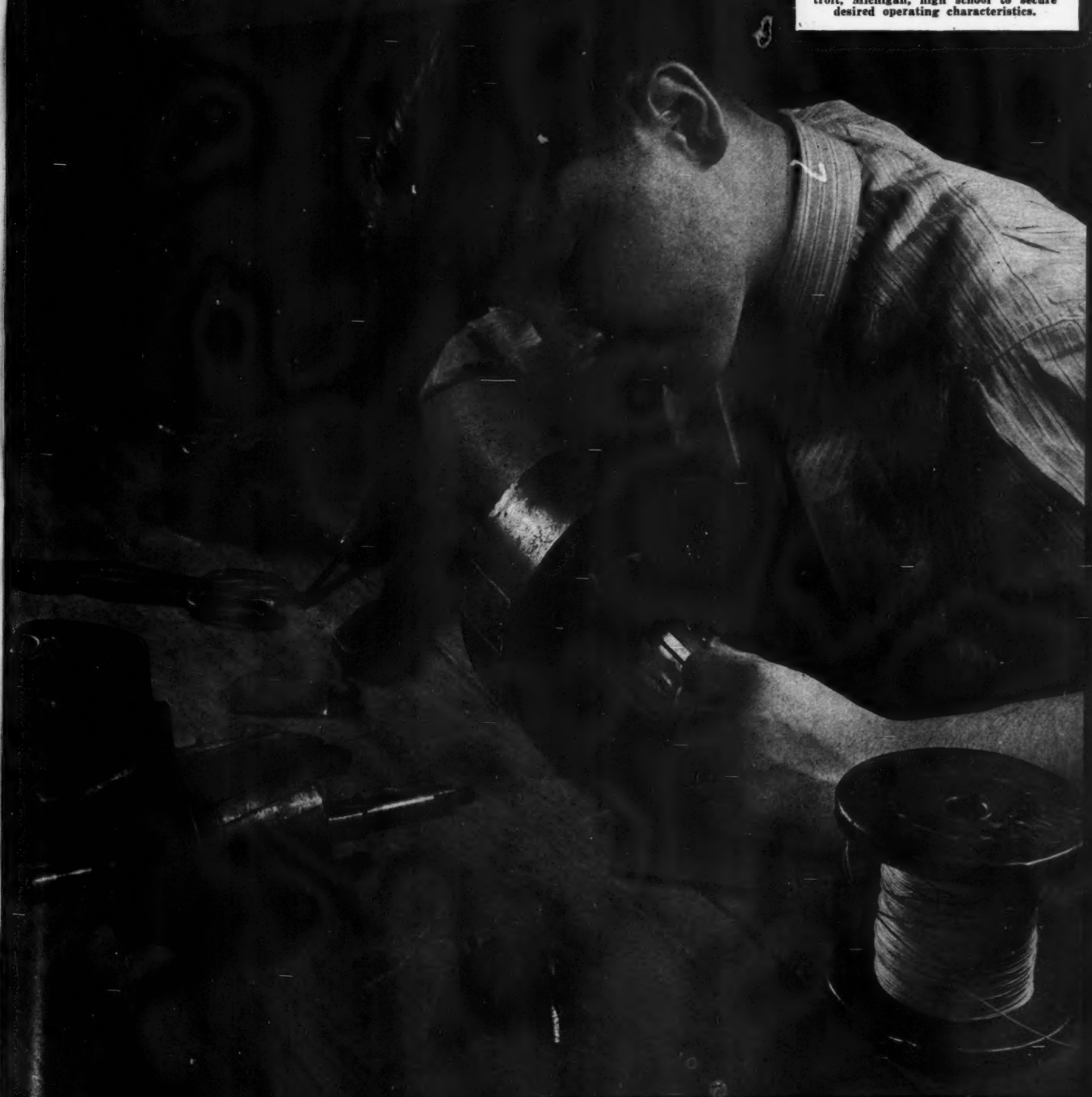
Crystal Gazing at the Next Decade
by R. Lee Hornbake

The Sling Psychrometer
by Clarence A. June

Pipe Holder
by Henry Brasseur

Plastic Mail Box
by Andrew Kovach

On the cover: Student rewinding a motor in the electrical shop of a Detroit, Michigan, high school to secure desired operating characteristics.



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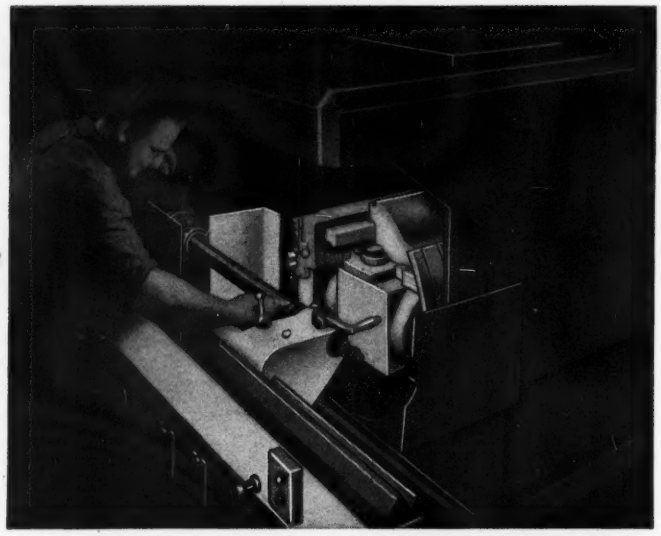

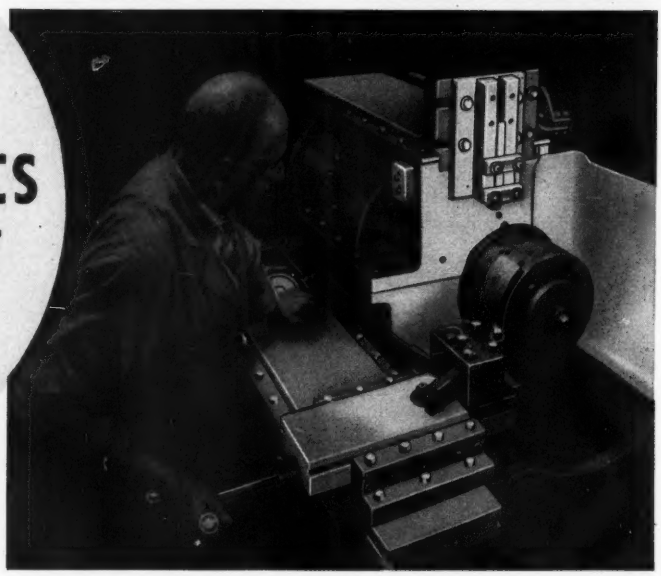

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School Shop

FOR INDUSTRIAL EDUCATION TEACHERS

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School Shop TALK

COMMENTS ON ISSUES FACING INDUSTRIAL EDUCATION

Democracy in the School Shop

By G. Harold Silvius, Chairman, Department of Industrial Education, Wayne University, Detroit, Michigan

TEACHERS are anxious to teach democratic principles, values, and processes. They realize that the methodology used in the classroom in American schools is often based on an autocratic approach and that if democracy is to be taught, it must be practiced; it is the method and not the content.

The purpose of this statement is to enumerate a number of the activities in a typical shop class that provide opportunity for a democratic approach:

1. The entire organization of the work can be directed by a student organization which is carefully planned by the group. The officers of the class assume responsibility for carrying on the work. Students with leadership ability are given opportunity to develop their potentialities. It is more than a monitor system where students simply do prescribed duties. Pupils feel that their participation in the student-directed organization is as important as the content they are studying. The teacher has his place in the organization, the same as other officers.

2. Students can participate in planning their work. There are times when the class works as a whole, but the pattern would be that each student is encouraged to plan his work and carry it out in an individualized manner. This provides a means for the maximum growth of each student. The teacher has enough information about each student to determine if he is working to his capacity.

3. Each student can participate in the evaluation of completed work. The individual student evaluates his own work and then checks with a committee; the teacher then checks with the individual and the committee regarding the validity of their decision. Each student will also know how he is moving toward the fulfillment of the aims established for the course.

The Shop Teachers' Battleground

No one questions the statement that the shop teacher is the most important single element in the industrial-education program. Shop equipment may be superb, buildings grandiose, supervision expert, but if the teacher is no good, the program is worthless. There is no need to labor the obvious that the shop teacher makes or breaks the educational effectiveness of a program.

As the keystone figure in the industrial education arch, the teacher depends on other factors than himself to do a top-notch job. He is supported and aided by the school administration, both general and in his subject-matter field. Teacher-training institutions have given him background and technics for his work. State and national officials in governmental agencies concerned with education work to help him make his teaching more effective. Leaders in national policy making give him material to buttress his efforts. Publishers produce magazines and books to aid him in his instructional task. The teacher is the keystone, *but* he sometimes overlooks these other factors that support him.

All too often the shop teacher considers that his only battleground is the shop in which he teaches. Yet as the keystone in the arch, he will fall if the supporting blocks, such as those mentioned above, crumble beneath him.

It behooves the shop teacher, therefore, to be on the alert. There are issues all about him that may not be impinging on his prerogatives at the moment, but they are definitely part of the pattern of his work and responsibility. He needs to know about them. He should think about them and express himself about them.

Such issues as the dichotomy of industrial arts and trade and industrial education, the laboratory of industries vs. the unit shop, the services performed by the Vocational Division of the U. S. Office of Education are as important a part of the teacher's daily work as keeping the shop clean! Yet apathy is all about us and the battleground comes closer.

The progressive shop teacher will keep himself informed and thus be on the alert.

Your Editor

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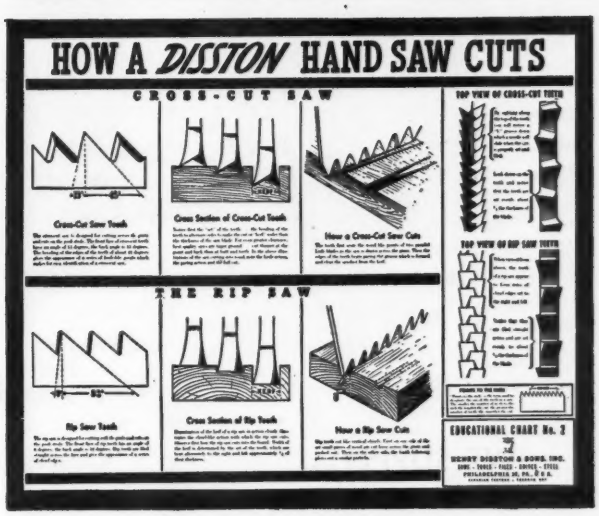

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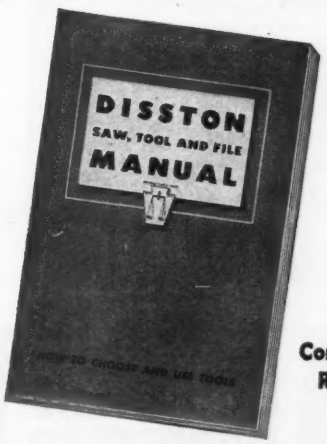

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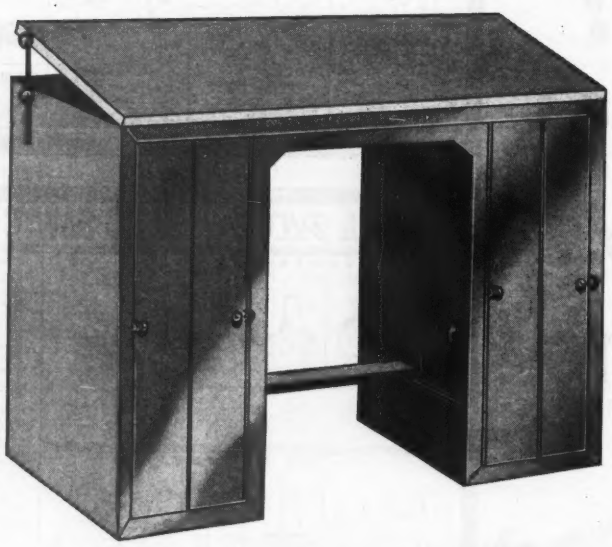

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Crystal Gazing at the Next Decade

or Industrial-Arts Education in Retrospect from 2020 A. D.

BY *R. Lee Hornbake*

Looking at the present with the perspective of the future is often enlightening. Here is a report from a little-known volume that will give you pause to cogitate. R. Lee Hornbake is Professor of Industrial Education at the University of Maryland, College Park.

I MUST admit from the outset that I possess no unusual means of foreseeing the future. Of course, I do live very close to Washington, D. C., and that I consider an advantage when developing a topic such as: What type of teacher should be prepared to meet the needs of industrial-arts education in the next decade?

A defensible answer to this question should be presented as a working hypothesis, assuming that we do not choose to let industrial-arts instruction remain a generation behind the times.

That Crystal Ball

This subject involves forecasting, so I assumed that a crystal ball would be of inestimable help. As Washington is the meeting place of crystal gazers, I proceeded to look for a good crystal ball. Turning to the yellow pages in the telephone directory, I observed the impressive advertisement of a crystal ball company located on J Street, N. W., established in 1800, the year that Washington, D. C., entertained Congress for the first time.

The ad looked promising so I paid the firm a visit. A middle-aged gentleman with a very high forehead and jutting chin greeted me as I entered the office. He was obviously the proprietor. Not knowing how to describe what I wanted, I said apologetically, "I should like a crystal ball with a diameter of ten years."

The proprietor smiled in disapproval of my nontechnical and very inaccurate statement of need. He assumed an air of superiority when he asked, "Just what *kind* of gazing are you planning to do?"

"What kind?" I said. "Do you mean crystal balls are made for specific purposes?"

"Most assuredly," he replied. "We make them to order. We make crystal balls for senators and governors who aspire to become president. With every such crystal ball we provide a hat to throw into the ring. We make crystal balls for Congressional investigating committees. . . ."

At that point I interrupted by saying, "I am an educator—a teacher-educator. All I need is a crystal ball for forecasting what we should do in the way of preparing industrial-arts teachers for the next decade."

"That is a very glamorless subject," said the proprietor. "Furthermore, you probably would not be able to afford a crystal ball of our manufacture. I was once a college professor myself, a professor of economics, but I took up crystal ball manufacturing in order to make a living. Very few politicians request educational crystal balls so that runs up the cost of the several we do make. Your only chance would be to obtain one that has been turned back to us by a climbing politician who has outdistanced his original crystal ball."

Probably I should have given up at this point but I pressed my need one step further. I simply said: "Does that 'bi-partisan' senatorial group still have the crystal ball they used when 'supporting' Bill S472—the federal-aid-to-education bill?"

The proprietor blushed—at least his face reddened as he replied: "I regret to say that the ball recently obtained by that group has a defect. In our universe of discourse we refer to the defect as DDT."

"DDT? Why, that is an insecticide or something," I interjected.

"It is plain to see, professor," said the proprietor, "that you are new at this crystal ball business. DDT signifies to us in the know—*Deceit and Double Talk*. It is a rather common defect in political crystal balls."

By this time I felt I had the beginning of a liberal education in crystal balls but obviously I had not gone very far in finding an answer to the question: What type of teacher should be prepared to meet the needs of industrial arts during the next decade? I thanked the proprietor for his time and kindness and backed out toward the street door. The proprietor replied almost inaudibly, saying something to the effect that colleges and universities must be at a low state of repair as regards staff. I did not ask him to repeat, for I felt certain his comments were not exactly pertinent to my topic.

No Doctoral Dissertations

Returning to the university I discussed my lack of progress with several colleagues. I was taken to task by them for assuming that such a profound problem could be solved so easily. This problem, they insisted, was a problem for careful research. The procedures they suggested were very sound, I do believe, but the several procedures approached the problem via the doctoral dissertation route. Time, of course, did not permit such an involved treatment. I needed a quicker and more direct answer than doctoral dissertations yield. But I did feel the necessity of taking the problem seriously and I vowed to do so.

History, I assumed, should help a lot. This is essentially an historical study, I reasoned, in the sense that history, properly examined, would reveal those directing forces which gave rise to our current problems and circumstances. Then if we could anticipate how these forces may vary and how they may be controlled we would have a sound basis for making predictions.

I tried to dismiss from my mind my original, nonprofessional, crystal-ball approach to my problem as I reverently entered the local library. As soon as I drew my first breath of air in the reading room I knew I was in the right atmosphere for profound thinking.

There were history of education books by the score—Anderson, Bennett, Butts, Cubberley, Eby, Graves, Monroe—to mention only a few of the more popular ones. With all these I was passingly familiar but somehow I felt they did not contain the necessary data. So I presented my problem to a learned-looking attendant.

He was a stoop-shouldered, thin man wearing very thick-lensed glasses. He had a musty odor about his person and an authority in his voice developed through the knowledge of countless, assorted facts. He went with me to the card catalog and found the same titles I had previously found. It seemed to irk him to know that so far he had not been very helpful so he excused himself from my presence with the explanation that there may be some additional references in the receiving room, not yet catalogued.

I waited patiently for more than an hour, meanwhile wondering if I should

not look for references outside the field of education as, for example, in economics, sociology, politics and government, and the like. I did not get far along this line of reasoning when the thin librarian appeared with satisfaction written all over his countenance. He had apparently come across something I had not discovered myself.

He placed a book on my reading desk, raised his eyebrows and said with hushed firmness, "There is a book that should contribute slightly to your problem."

The Present in Retrospect

I was dumbfounded at the title on the jacket which indicated the recency of the book. The title was: *History of Manual and Industrial Education 1917-2017*, by Marcus Fitzgerald. "This can't be," I remonstrated. "There must be a typographical error. This is only 1948."

The attendant said with an air of cold detachment, "Shall I leave the book or do you choose to have me return it to the receiving room?"

Naturally I kept the book. There was no mistake about it. The book bore the copyright date of 2020 A. D. The book was well written, it was carefully documented, and it had a highly complimentary foreword written by an educator whose greatgrandfather had been my former college professor. To make a long story short, I turned to the section covering the years 1947-1957. I can probably do no better than to abstract those sections which are pertinent to the problem: What type of teacher should be prepared to meet the needs of industrial arts during the next decade? The following statements are direct quotations from Fitzgerald's *History of Manual and Industrial Education 1917-2017.*

By August 14, 1945, industrial-arts education, like public education in general, had suffered a professional relapse. Many school shops had been closed during the war due to the lack of teachers, despite the need for technically trained personnel in the armed services and industry. A high percentage of shops were staffed by persons lacking professional qualifications and frequently technical qualifications as well.

The armed services demobilized quickly but many former industrial arts teachers did not return to public schools because of the inadequate salaries and because of certain unfavorable working conditions long associated with teaching. Much thought and effort were devoted to the recruitment of persons to enter the profession but relatively little attention was given to why professionally prepared and capable men preferred not to reenter the profession. Teacher-education institutions made no systematic effort to determine how many persons should be prepared for industrial-arts teaching but instead operated on two generalities or slogans: (1) There has never been an excess of industrial-arts teachers; and (2) we can always place our surplus teacher supply in the State of ———.

The armed services had built up stock piles of materials and equipment in many parts of the world. The Defense Plant Corporation had built enormous production plants throughout the United States and had equipped these plants with the finest of tools and machines. Much of this facility was distributed to other governmental agencies and to schools, following the close of the war. Supervisors of industrial arts spent most of their time in obtaining surplus properties and in allocating these properties to the various shops. Not infrequently the industrial-arts program came to be built around the equipment so obtained. Teachers sometimes had difficulty in using bull dozers, radar trucks, and Allison engines to optimum advantage but they made a sincere effort to do so. School shops did receive some excellent and very usable equipment but a basic consideration of what should constitute industrial arts in the post-World War II period was disregarded.

Secondary education as a whole changed very little in the 15-year period following the war. The secondary-school population remained about the same until the "war babies" came of high-school age in the middle fifties.

School administrators read with interest such reports as *General Education in a Free Society, Education for All American Youth,* and *Living in an Atomic Age.* Insofar as industrial arts was concerned, the administrators were largely uninformed. They were for the most part classical educators at heart but accepted industrial arts and other practical arts because there were certain pupils for whom a practical approach had great appeal.

As we look back on the period of 1947-1957 from the vantage point of the year 2020, it seems that the industrial-arts teacher-education institutions would have been justified in doing on a countrywide scale what a few pioneering institutions were doing in a rudimentary way. The contributions of these pioneers have been widely accepted and used since 1994, with certain essential modifications. A few of the more important contributions are described in the following paragraphs.

It was apparent to a few industrial-arts educators by the year 1950 that industrial-arts teachers needed a much broader perspective of education than they had been developing in the typical four-year under-graduate program. It was not unusual to find an industrial-arts teacher who could do a respectable job in a variety of shop activities; he could make a lesson plan and he could give a good demonstration. But he had little notion as to the function of schools in a democratic society and, in fact, had only a high-school history book concept of American democracy. He read with slight understanding—if at all—such brochures as *Education Through Work* and *Work as Education.* A few institutions did make honest effort to overcome this shortcoming and their graduates derived much personal satisfaction from teaching.

There was general agreement as early as 1937 in the federal bulletin, *Industrial Arts: Its Interpretation in American Schools,* that the industrial arts teacher carried the major responsibility for interpreting industry to the adolescents of America. This task implied that the industrial arts teacher should know industry broadly and from first-hand experience.

The simplest solution was to require the prospective teachers to spend time in industry either during summers or prior to enrolling for the college program. This procedure was criticized by the more careful thinkers because such contacts with industry did not assure a basic understanding of industry. The industrial-arts trainee was likely to work at a routine job and to return to the same job summer after summer. In contrast, a few institutions planned a series of systematic work experiences for prospective industrial-arts teachers. By so doing, the student got the feel of various aspects of the manufacturing industries including industrial relations, production control, quality control, safety, engineering, as well as for manufacturing processes.

One of the major professional problems from 1917 to 1957 and beyond was the lack of working relationship between industrial-arts *instruction* and industrial-arts *objectives.* Even a lay observer could see quite readily that whereas the industrial arts teacher or supervisor gave allegiance to six, eight, or ten objectives, he actually conducted a program which advanced two or three objectives at the most.

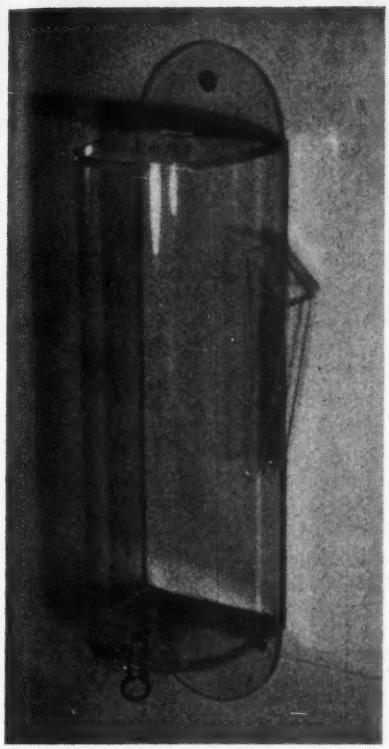
It is apparent now that the essential impediment was the almost universal neglect to study the accepted objectives for what they meant in terms of pupil or student growth. The industrial-arts professors, supervisors, national committees, and teachers were so naively involved in making tool-operation analyses that they by-passed an answer to the question: "What influence do we want to exert on adolescents and youth?" in favor of such questions as "How many wire splices should be taught?" and "Should a project with an end-lap joint precede or follow a project with a cross-lap joint?"

A few people worked with little notice and with no approbation on analyses of an entirely different type. They tried to define objectives in terms of behavior. How does an intelligent consumer act? What is awareness to social and economic problems? What are good work habits? They then attempted to describe ways and means of bringing about the desired changes in behavior. Industrial processes, products, and materials were taken seriously rather than glossed over with perfunctory listings of hackneyed tool operations. The efforts of the latter group did not gain attention until the entire secondary-education program was taken for a "shakedown cruise" following its major overhaul in the sixties.

High schools continued to be relatively small in size through 1957, the average pupil population being approximately 275 as of that date. For this reason, the multiple-activity shop was a very prevalent organization plan. Industrial-arts teachers were, therefore, prepared to teach and supervise a variety of shop activities.

But there was a complementary trend. Specific occupational preparation tended to be postponed until pupils reached age 16 and, in some instances, age 18. The postponement resulted in a condition which made it necessary for industrial-arts teachers to offer more advanced and more specialized instruction to certain pupils in grades 10, 11, and 12. In the smaller schools, the industrial-arts teacher not only had to be able to operate a comprehensive general shop for pupils of junior-high-school age but he also had to have competence essential to teaching one or more units

(*Continued on page* 31)



Clear Plastic Mail Box

BY *Andrew Kovach*

This is an unusual mail box that will interest advanced students and makes a good take-home project. Many operations and procedures can be taught through its construction. Andrew Kovach teaches at Hershey Vocational School, Hershey, Pennsylvania.

THIS transparent plastic mailbox is an excellent project for the advanced student in plastics because a high degree of accuracy with hand tools is required to produce the many parts that must match when the job is assembled.

Four years of weathering on the original mailbox have not produced any noticeable defects, so it can be recommended as a very serviceable as well as attractive box. Being transparent, it is not necessary to open the mailbox to see whether or not the postman has been there.

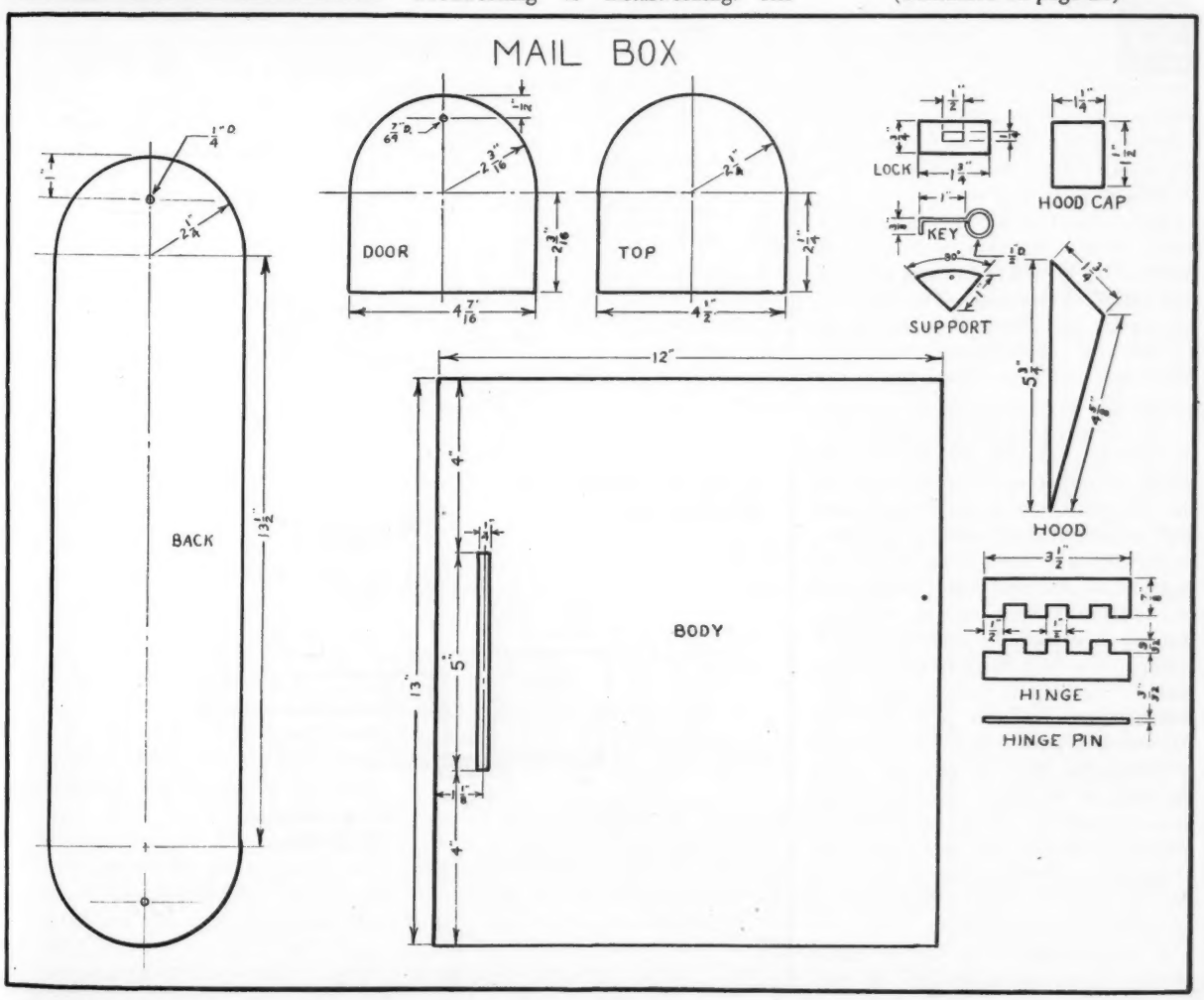
The operations involved in the construction are layout, sawing, filing, drilling, forming, sanding, buffing, masking, cementing, polishing, riveting, stencil cutting, and coloring.

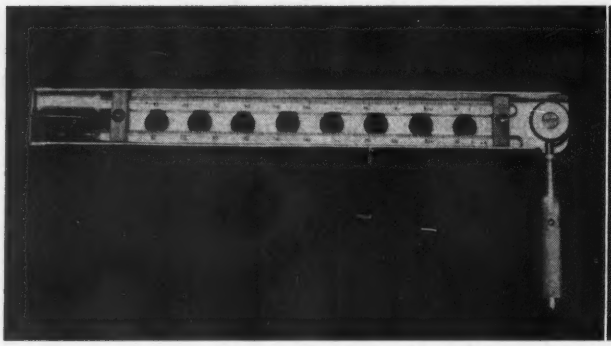
Shaping of the flat pieces of Plexiglas or Lucite will not present any special problem to the student who has had experience with the common hand tools of woodworking or metalworking. All edges are finish filed as fine as possible so as to reduce the time required for the sanding that will follow.

The initial sanding is done with a wet-or-dry sandpaper of 320 grit and is followed up with 400-grit paper. Use a liberal amount of water during this operation and continue sanding until the edges are free of all scars coarser than those produced by the finest sandpaper.

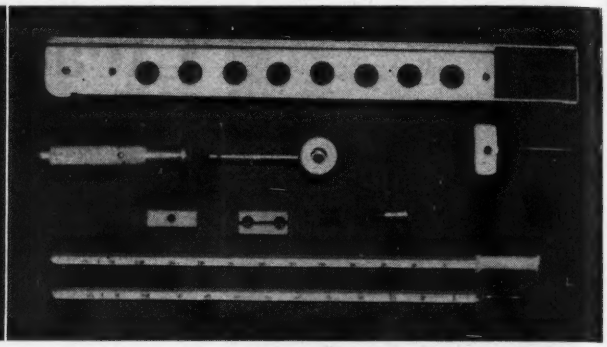
Final sanding is followed by buffing with firm cloth wheels to which a fine abrasive, such as tripoli compound, has been applied. Lubricate the plastic with

(*Continued on page* 20)





View showing assembled sling psychrometer ready for use.



View showing various parts of sling psychrometer ready for assembly.

The Sling Psychrometer

BY *Clarence A. June*

This fascinating device can be used to stimulate interest in meteorology and is useful for students in science work, air conditioning, and aviation, as well as for personal home use. Clarence A. June teaches at the J. M. Wright Technical School, Stamford, Connecticut.

THE relative humidity of the air can be measured easily and accurately with a sling psychrometer. Students will be interested in this instrument for use in their science work as well as for personal use in determining the moisture content of the air in their homes.

This project is useful as a device about which to teach something of meteorology as well as teaching machine and hand-tool operations. The materials are readily available in the shop except for the two thermometers and wick which can be obtained from laboratory supply houses or drug stores.

The sling psychrometer is operated as follows: Turn the handle at right angles to the frame. Wet the wick on the bulb end of one of the thermometers with water that is at room temperature, being very careful not to get any of the water on the other bulb. The best method of doing this is to use a medicine dropper. Next twirl the psychrometer for a minute or so and then take the readings quickly on the two thermometers. The readings are recorded and then the process is repeated to avoid error. A psychrometric table is used to secure the relative humidity and dew point from the readings. The figures are taken directly from the table and require no computation. Dew point is measured in degrees while relative humidity is measured in percentages.

A psychrometric table can be easily secured from manufacturers of air-conditioning equipment or from the Superintendent of Documents, Washington 25, D.C. When writing the latter, ask for U.S. Weather Bureau Bulletin No. 235, *Psychrometric Tables.*

The thermometer with the dry bulb indicates the temperature of the air, of course. The reading of the wet-bulb thermometer is lower because the water in the wick evaporates, thus cooling the bulb. The rate of evaporation varies with the amount of water vapor in the air. If the air is very dry, the water will evaporate rapidly and cause a low read-

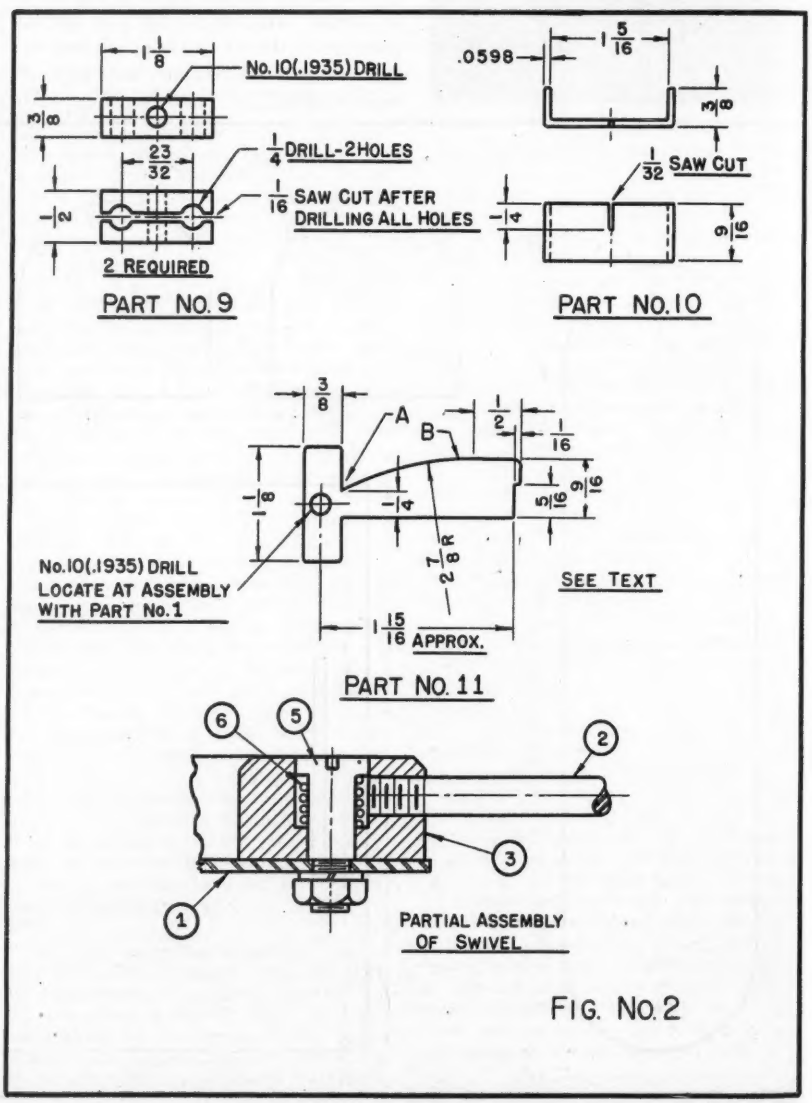


FIG. No. 2

ing on the thermometer. Conversely, if the air is full of moisture, the cooling process will be much slower and there will be less difference between the readings on the two thermometers. Relative humidity is the ratio between the amount of water vapor in the air and the maximum amount it can contain at a given temperature. Dew point is the temperature at which the air, during cooling, becomes saturated and the water vapor condenses, forming water droplets.

The construction of this sling psychrometer is not difficult and it affords an opportunity to use many of the facilities of the metalworking shop and to teach a number of processes and skills.

Parts 1 and 10, the case, on the drawings may be made by students in the sheetmetal department. Stainless steel is excellent or sheet steel painted with aluminum paint can be used. The eight holes, ½" in diameter, in part 1 are punched out to lessen the weight. Part 10 is spot welded to part 1 or it can be riveted, if welding equipment is not available.

Part 2 is made of bronze and should be threaded very tightly into part 3 which may be made of brass or cold-rolled steel and painted with aluminum paint.

Part 4, the handle, which is made of aluminum, has a hole drilled into it 2⅛" deep with a No. 11 (.1910") drill so as to give a running fit for part 2. The tapped hole 1½" from the end is a No. 2-56 N.C. fillister-head machine screw.

Part 8 which screws into the tapped hole of part 4 is a standard No. 2-56 fillister-head machine screw which has been remachined to the given dimensions. This screw keeps part 4 on part 2 and allows it to rotate freely as the .064" diameter end of the screw has free play in the .070" by .050" groove in part 2.

The inside diameter of the spring, part 6, is ¼" and consists of four full turns of No. 13 gage (.031") music wire.

The clamps for the thermometers, part 9, are made of soft wood such as pine. Two are required. They are used to clamp the thermometers to part 1 with No. 10-32 N. F. round-head brass machine screws 13/16" long which have lock washers and nuts on the ends which pass through the bottom of the case, part 1.

The separator, part 11, goes between the bulb end of the thermometers and is made of 22-gage (.0299") sheetmetal and is painted with aluminum paint. The drawing shows the developed piece which is bent up at a right angle at point

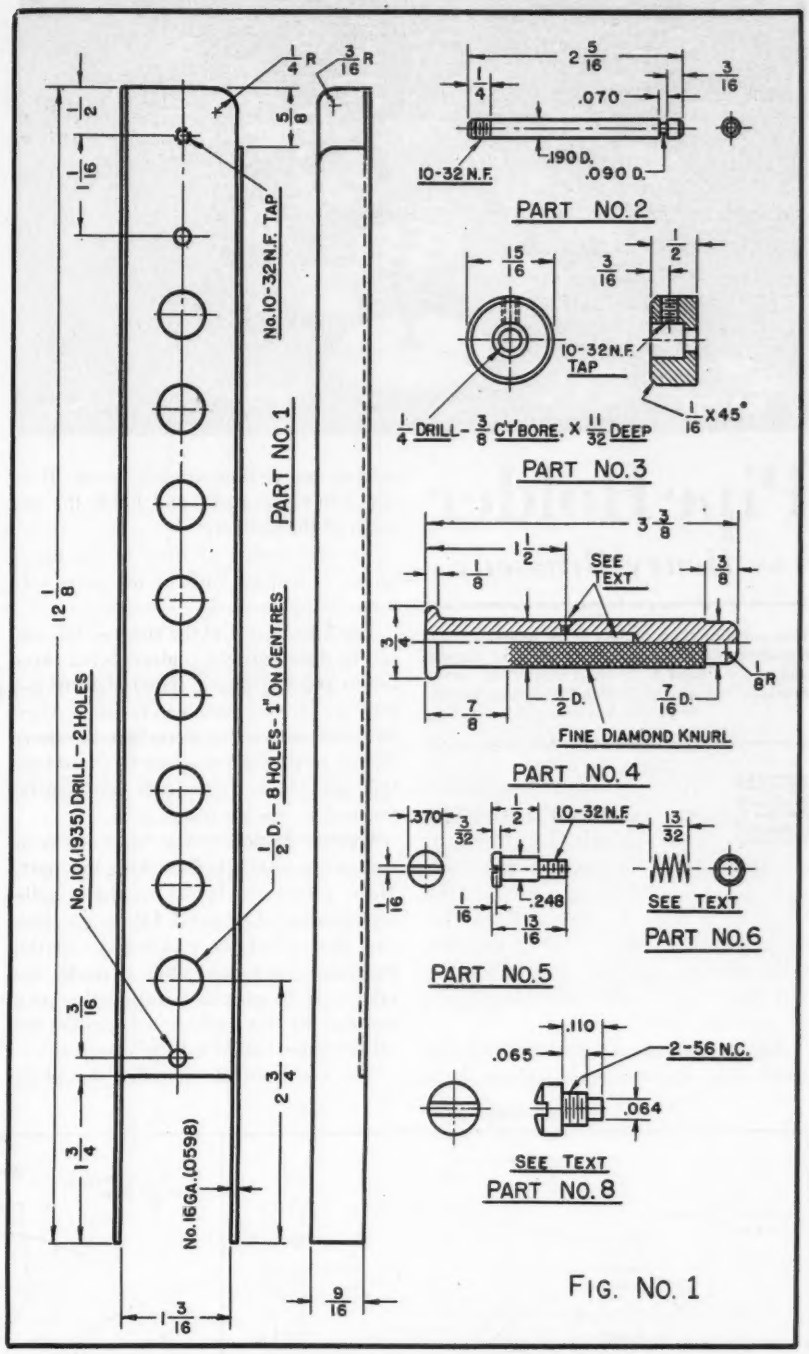


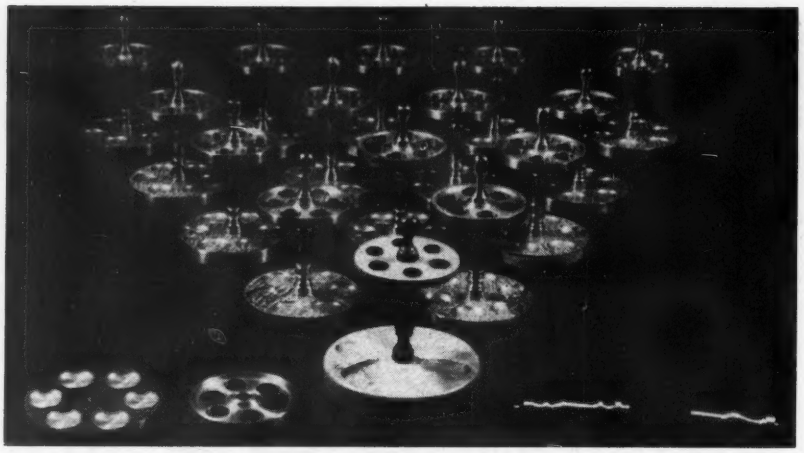
FIG. NO. 1

A so that edge *B* is on the center line of the drilled hole. This piece is placed under the bottom of the thermometer clamp, part 9, and on top of the end of the case, part 1. The small projection on the end fits into the 1/32" saw slot in part 10.

Part 5 is a shoulder screw made of brass and is part of the swivel assembly shown at the bottom of Fig. 2. This type of swivel is used because it allows the handle, part 4, to be turned at right angles to the case, part 1, rather stiffly so that when the psychrometer is twirled it will not wobble.

The thermometers are 10¾" long. They must be of good quality and matched for reading. The graduations should be marked on the glass as there is insufficient room on the case for strips of paper or metal with the graduations marked on them.

As the psychrometer is rather fragile, it is well to construct a case of heavy leather or wood for it. The case should be long enough so that the handle can be turned in a straight line with the body of the instrument.



Pipe Holder

BY *Henry Brasseur*

This machine-shop project is an interest-arousing natural for both day and evening classes and can be used to teach form cutting. Henry Brasseur teaches at Arthur Hill Trade School, Saginaw, Michigan.

TESTED INSTRUCTIONAL PROJECT

THIS pipe stand has been a useful project with both adults in evening school and boys in day trade classes in machine shop. The men make it for their own use and the boys take it home for their fathers who are appreciative because of the intrinsic value of the project as well as for the fact that it shows what their sons can do in machine shop.

The project can be used to teach the usual lathe operations as well as form cutting and milling-machine work. It is not difficult to make and holds the interest of the students.

An explanation of some of the operations in making each of the parts follows:

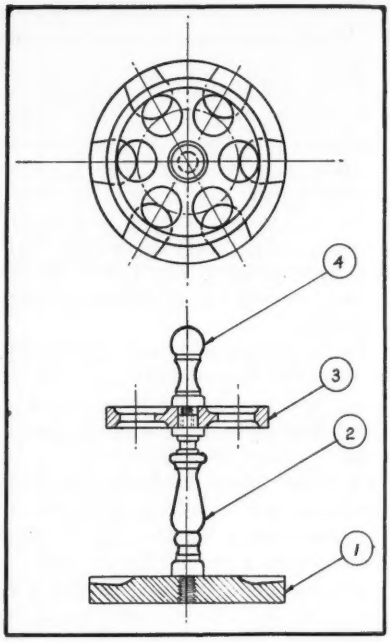
Top Spindle.—Cut the stock so the job can be done between centers, being careful to true it before center drilling so that ¾" D. steel stock can be used. After the job is between centers, turn the short ⅜" D. so that the dog can be placed on this end. The entire spindle can then be finished in this position.

Center Spindle.—The use of form cutters can be taught in making this part. Make a full-size layout of the spindle on a piece of sheetmetal. File to the lines and then grind the tool bits to fit the template. After one cutter is made, the others can be ground to follow the same contour. By this method, the spindles for all the pipe stands will be identical.

The finish on the spindles should be protected so it will have a high luster.

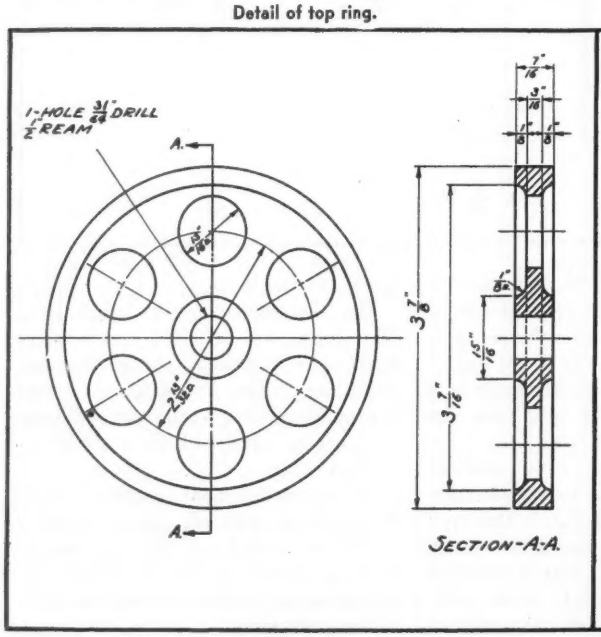
Top Ring.—The top ring can be made of ½" steel or boiler plate. Cut a 4" square, place in lathe chuck, and turn all the diameters on both sides. After the turning has been done, lay out the holes and place back in the lathe and true up to each hole. Center and drill, as well as bore to size. Then move the job around so each hole can be finished in the same manner. If this is done in the drill press, the holes will not be as accurately placed as when they are trued up to each center.

Base.—The procedures are the same

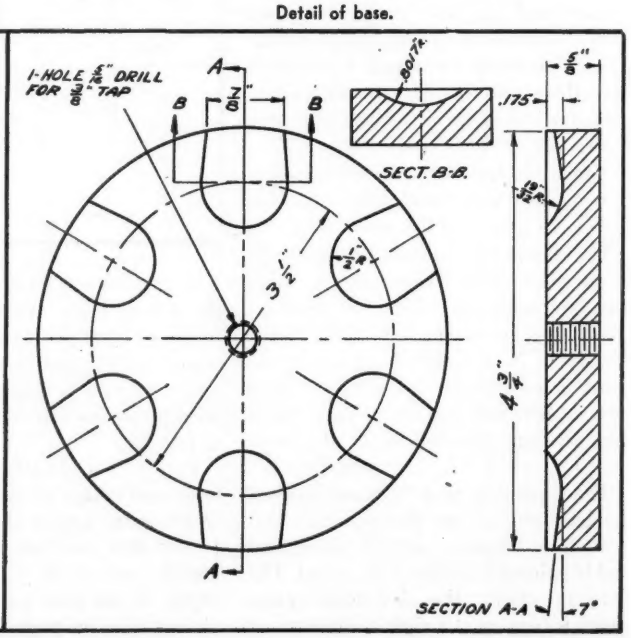


Assembly drawing: 1—Base; 2—Center Spindle; 3—Top Ring; 4—Top Spindle.

Detail of top ring.

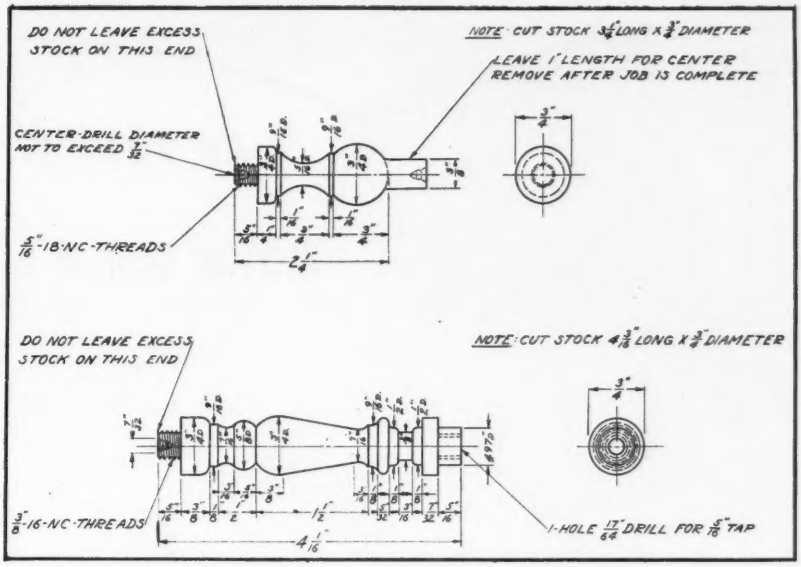


Detail of base.



for the base as for the top ring except that it is thicker material. After the turning is completed, the base can be laid out for center lines where the milled concave sections are to be placed. A special cutter is used which is made specially for this purpose. If cutter grinders are available, it is very easy to make one to fit the specifications.

Polishing.—To polish the flat parts on the base and the top ring, cut several pieces of wood doweling about 3" long and glue a small piece of fine emery cloth on each end of the piece. When the glue is dry, they can be used in the drill press to spot the flat pieces and give it an attractive and dressy appearance. A small amount of oil should be used as a lubricant on this operation to prevent the emery cloth from cutting too deeply.


DO NOT LEAVE EXCESS STOCK ON THIS END
NOTE: CUT STOCK 3¼" LONG X ¾" DIAMETER
LEAVE 1" LENGTH FOR CENTER REMOVE AFTER JOB IS COMPLETE
CENTER-DRILL DIAMETER NOT TO EXCEED 7/32"
5/16"-18-NC-THREADS
2 1/4"
DO NOT LEAVE EXCESS STOCK ON THIS END
NOTE: CUT STOCK 4 3/8" LONG X ¾" DIAMETER
3/8"-16-NC-THREADS
1-HOLE 17/64" DRILL FOR 5/16" TAP
4 1/16"

Right.—Details of Spindles.

Circuit Demonstrator

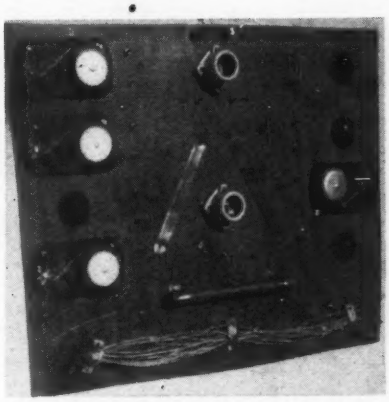
BY *George E. Crabtree*

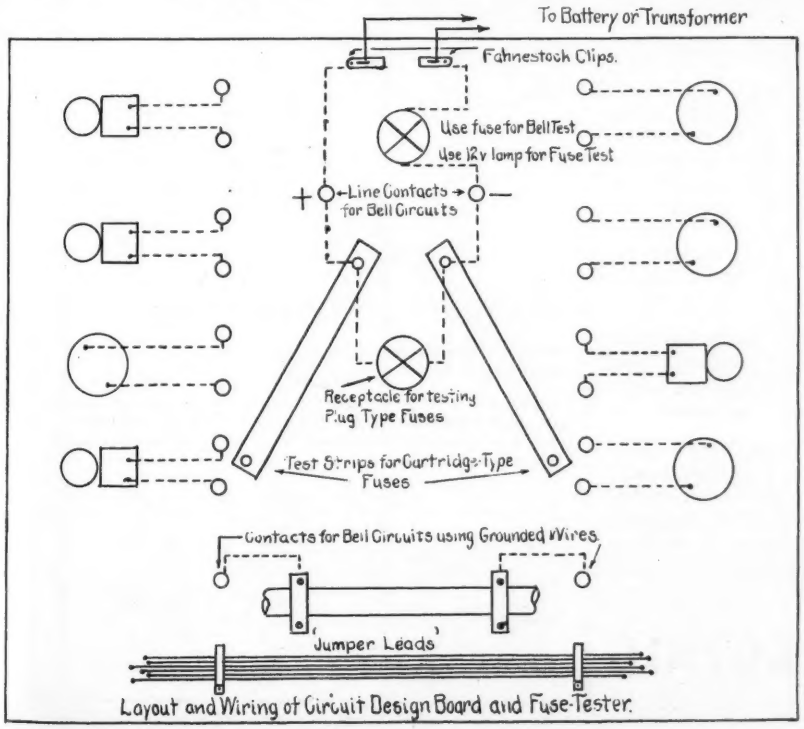
Teachers of electricity will find this a helpful instructional device. George E. Crabtree teaches at Thomas N. Hart School, South Boston, Massachusetts.

CIRCUIT - DESIGN demonstrations can be done easily with this teaching device. I have found it of great value in an elementary electricity course. It is also useful for testing pupils on the completion of a unit in bell wiring.

The connections can be made rapidly by the use of the "jumper" leads and a large choice of circuits is available to the instructor.

The testing of plug-type fuses can be sped up if the shell of the receptacle is removed from the procelain base and the threads flattened. The shell can then be replaced and the fuse inserted quickly.




To Battery or Transformer
Fahnestock Clips
Use fuse for Bell Test
Use 12v lamp for Fuse Test
+ ←Line Contacts→ —
for Bell Circuits
Receptacle for testing Plug Type Fuses
Test Strips for Cartridge-Type Fuses
Contacts for Bell Circuits using Grounded Wires
Jumper Leads

Layout and Wiring of Circuit Design Board and Fuse-Tester.

The list of materials follows:

Baseboard, 24" x 20" x ⅞".

Two Fahnestock clips.

Four pushbuttons.

Twenty 6/32 x 1½" brass machine screws.

Forty 6/32 brass nuts.

Two ¾" x ⅛" copper buss straps, 7½" long.

½" copper pipe or tube, 8" long.

Two clips to support pipe.

Twenty jumper leads, No. 18 fixture wire std., 20" long.

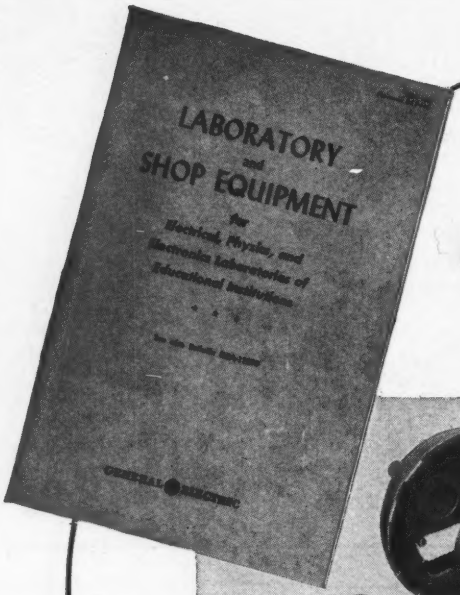
Forty miniature lugs for jumper leads.

Three clips to support jumper leads.

Two cleat receptacles, Edison base.

12-volt indicating lamp.

15-ampere fuse to use as S. P. switch.



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1/4 hp	110 volts	single phase	capacitor type
1/2 hp	115/230 volts	single phase	capacitor type
1/2 hp	220 volts	three phase	squirrel cage
300 w	125 volts	d-c generator	or motor

But these kits are just one of the many equipments General Electric has designed or selected for their teaching value. We can equip the complete electrical laboratory for the high school, technical institute, or engineering college. Write for our Laboratory and Shop Equipment catalog. *Apparatus Department, General Electric Company, Schenectady, N. Y.*

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Position .....

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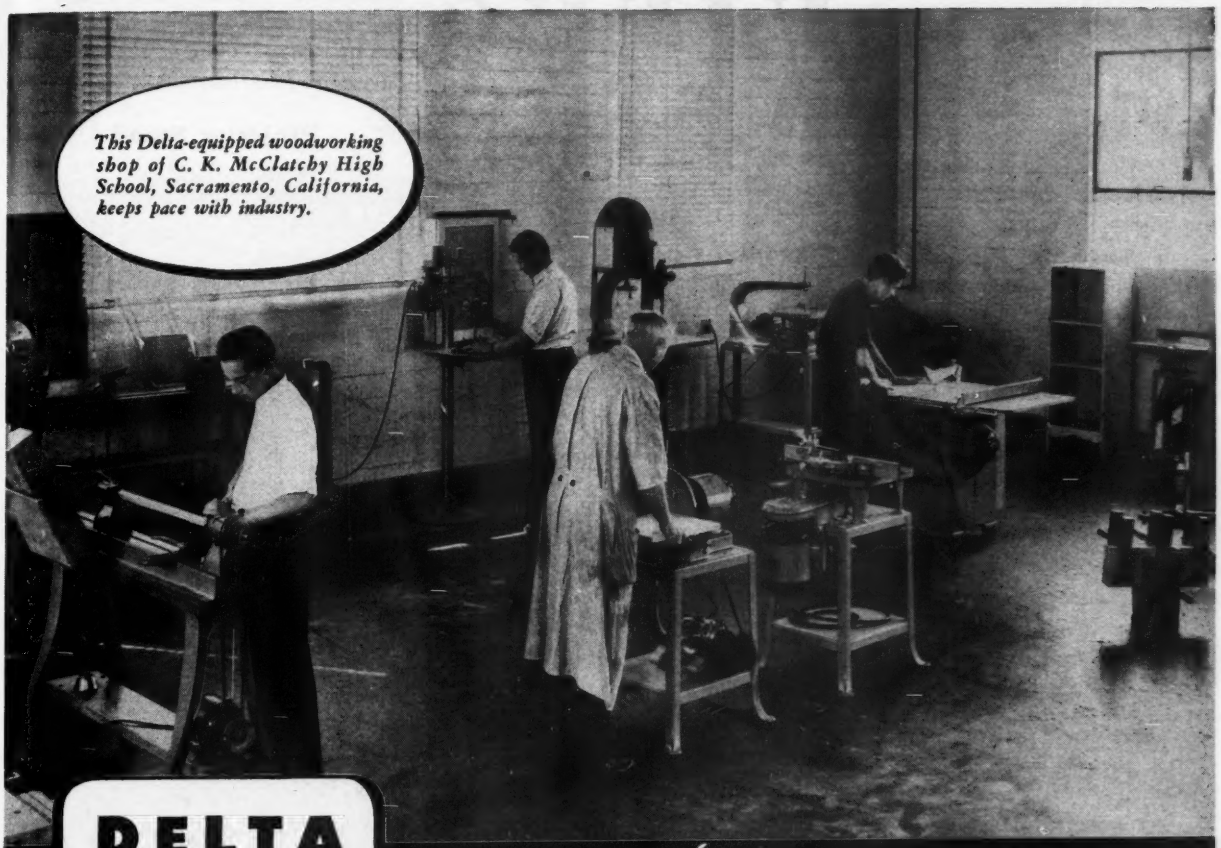

This Delta-equipped woodworking shop of C. K. McClatchy High School, Sacramento, California, keeps pace with industry.

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School Shop KINKS

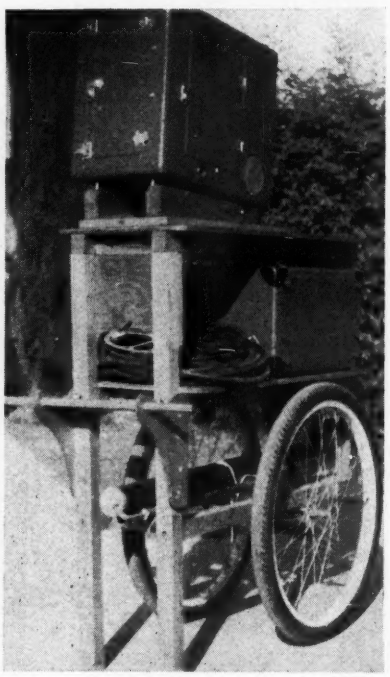
Payment will be made for each "Kink" published. Send to the Editor, School Shop, Ann Arbor, Mich.

Save the Pieces

Often a boy loses interest in his metal project when he ruins part of it by cutting the threads too small with a die after having spent several periods turning it up. To overcome this, I have cut the heads from standard screws and fitted them into knurled handles which have the sizes stamped on them. The boy sets the die to the gage and cuts the thread correctly. I do, however, advise the boy to open the dies about a half turn for the roughing cut and reset to the gage for the finishing cut.—*James H. Mitchener, Division of Industrial Education, Jamestown, N.Y.*

Projector Stand

The photograph shows how we solved the transportation problem for our projector which is used in various shops and classrooms. The project was constructed in our woodworking shop, except for the wheels and axles which were purchased from the local bicycle shop.

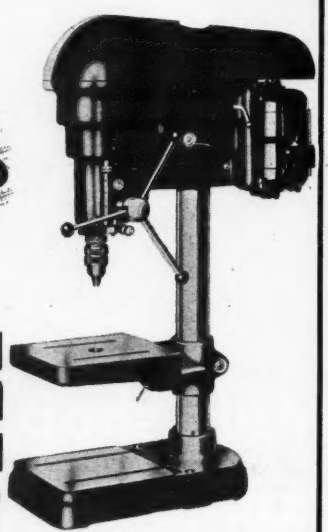


The stand was designed so that it is narrow enough to pass down the aisles when necessary. The projector is set high enough so that it projects well over the heads of students sitting in front of it.—*H. H. Ziemer, Head, Mechanic Arts Department, Lynwood, California, High School.*

Shine 'Em Up

As part of our training in craftsmanship and good care of tools, we teach our printing students to take good care of their composing sticks. Each spring they give their sticks a light coating of oil. One of the first assignments in the fall is to polish them. Mold polish used on type-setting machine molds is excellent for removing any rust or corrosion. It can be applied with a small block of wood and does not leave scratches that are found when emery cloth is used.—*Robert M. Smith, South Dakota State College, Brookings, S.D.*

BOICE-CRANE Series No. 2600 HELMET HEAD DRILL PRESSES



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84 different models for doing light and medium size work. Heads and other parts available for building up inexpensive special purpose machines.

Helmet-Heads have larger and longer quills for the spindle—to take heavier thrust loads and to do more accurate deep-hole drilling and tapping. Heavy box-type head has 33⅓% to 50% more bearing for the quill, so 4" or more of the quill is always supported. Hence, years more wear at the point where most light drill presses fail, also less vibration and fewer broken tools.

A costlier 6-tooth spline drive—involute shaped spline teeth, and all long-wearing steel instead of die-cast. Heavier-walled column, 3/16" thick for greater rigidity and closer tolerance at the chuck on heaviest thrust. Balanced for higher spindle speeds.

Tapping Heads, and full line of woodworking accessories for routing, mortising etc., are available as extras.

SPECIFICATIONS:

Capacity: 15"; Maximum ⅝" Drill, ½" Tap.
Spindle Feed: 4".
Speeds: Hi-speed Models—500, 925, 1750, 3250, 5500.
Slo-speed Models—425, 775, 1330, 2200, 3340.
Bearings: 4 New Departure Ball. Grease-sealed.
Spindle: ⅝" dia. 6-tooth involute type spline.
Tables: Standard—size 10" x 11"; tilts 45°.
Production—work surface 11" x 16".
Clearance Table to Chuck: Bench—17½"; floor—39½".
Height overall: Bench—42"; floor—71".

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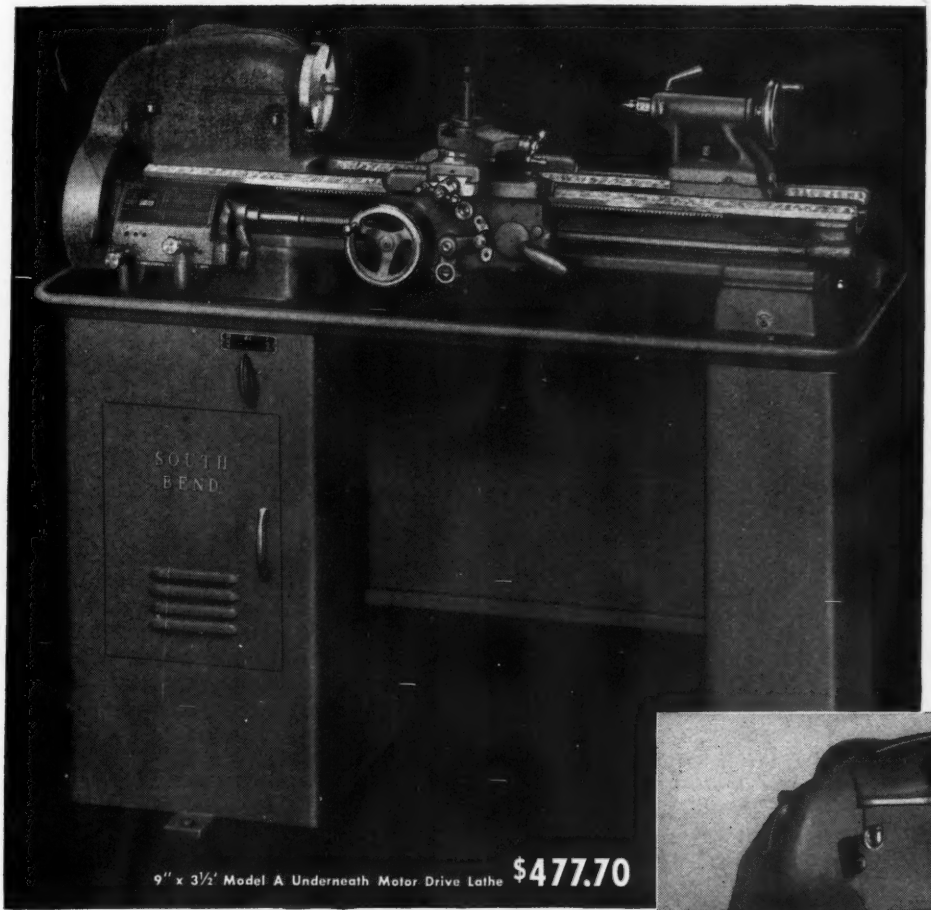
SOUTH BEND 9" LATHE

Ideal for School Shops



9" x 3½' Model A Underneath Motor Drive Lathe **$477.70**

B
A
C
This position of lever unlocks gear cover (A), headstock cover (B), and disengages motor drive (C) even if electric power is left on. Access is possible to gears (at A) or headstock belt drive (at B) only when these parts are not moving.
With lever in this position, the gear cover (A), and headstock cover (B) are locked in their closed positions, and the motor drive (C) is engaged.

This 9-inch swing South Bend Precision Lathe is small enough for the Junior High School boy to handle with ease, yet it has ample capacity for most shop projects. Ruggedly constructed for industrial service, it will withstand the abuse of student operation. Neat and compact in design, it presents an excellent appearance in the shop, and is economical of floor space and power. A built-in chip pan catches shavings and prevents the shop floor from becoming littered.

All gears, belts, and pulleys are fully enclosed. The motor and driving mechanism are built into the cabinet base under the headstock. Neither the end gear guard nor the cone pulley cover can be opened until driving power is disconnected. This, and other safety features, make the lathe almost foolproof. See illustration at right.

The price of this fine lathe complete with three-phase motor and drum control switch is only $477.70, f. o. b. South Bend. This low price enables you to provide more lathes—train more students on a limited budget.

SOUTH BEND LATHE WORKS

BUILDING BETTER TOOLS SINCE 1906 • 470 EAST MADISON STREET, SOUTH BEND 22, INDIANA

IN THE Morning Mail . .

[Brief comments about SCHOOL SHOP and the field it serves are invited. Address the Editor, SCHOOL SHOP, Ann Arbor, Michigan.

Gentlemen:

Some time ago I noticed a device similar to the one described in the March, 1948, issue of SCHOOL SHOP on page 24. This device was used to check drawings quickly.

I was about ready to make up some tracings to be used for checking purposes, but for some reason I started to consider just how this would stereotype my drawing work as our objective is to develop the mental powers of our students as well as the manual skills.

This type of checking device would presuppose that there is only one way to draw a set of views for a certain object. Likewise it presupposes that the dimensions must be placed as the teacher dictates.

This leads to the next assumption that a device of this kind can lead toward strictly copy work on the part of the students, which we all wish to avoid. We all hope that in mechanical drawing we have passed through the stage of copying a drawing view-by-view and dimension-by-dimension.

A copying type of drawing course will result in excellent drawings, but will the student understand what he has drawn and increase his knowledge? A plate could be made and your printer could turn the finished drawings out with a blank space for the pupil's name, but the student would have been cheated. Of course, the student learns to use the tools, but why not let the student try to select the views that tell the best story and let the student dimension the drawing under the proper guidance and direction of the teacher? Then if we found all the class selecting the same views, spacing and dimensioning them the same way so that we could use a tracing device, we would be truly amazed.

The tracing device might be helpful for one drawing early in the course, but to continue its use means that the student does very little thinking or planning. What would happen if we should give five real draftsmen a problem? Would they all use the same views, same spacing and dimensionings? I doubt it. You would have five drawings that would differ, but yet they would tell the same story.

There is much more to mechanical drawing than the copying of a few lines. The student should be encouraged to try different views and ways of showing objects. As drawing teachers, we must avoid the stigma that is sometimes cast on our subject by teachers of other subjects when they suggest that anybody can teach drawing if they have a set of plates to place on the bulletin board or wall.

Reasoning and planning can be developed in mechanical drawing if we try to teach the student to plan and reason. This is one of the hardest tasks we have as teachers, but by using a collection of problems that progress from simple to difficult drawings we can engender in the student a feeling of confidence and accomplishment.

Let us, as drawing teachers, try to encourage more reasoning as well as the skillful use of the tools so that our subject will be held in high esteem and maintain its rightful place in the curriculum of our American schools.

H. G. STINTSMAN,
East Side Commercial and Technical High School, Newark, N. J.

EDITOR'S NOTE: Mr. Larson's reply follows.

I definitely agree with Mr. Stintsman's comment on my recent article entitled, "Check Drawings Quickly," when he states that we should teach students to plan and reason in mechanical drawing. On the other hand I regret very much that Mr. Stintsman feels that a checking device will induce copy work.

It is obvious that students receive very little value from merely copying a drawing or plate, and surely no thinking teacher would knowingly encourage such a situation. Students, moreover, must have real learning situations involving problem solving and procedure planning. Thus the time element becomes an important factor.

In the drawing illustrating the article on the checking device there are 49 different points on which to check. Surely it would be a mistake on my part to think that I could remember all of these. A check list would be inadequate also because it would be too time consuming. A checking device, however, provides a rapid means of checking accurately the many drawings of the larger classes.

I cannot and do not use the checking device for all the drawings but find that it lends itself particularly well to the more detailed and complicated ones. Just recently I experimented with its use in development drawing and it is proving most satisfactory here also.

The spacing between views, I know, varies considerably and so does the placement of the various views as done by different students, but this matter is taken care of easily. As stated in the article. "The device can be shifted slightly so that other views can be made to coincide."

In the placing of dimensions, I naturally expect much more variation, as is evidenced by the drawing accompanying the article. Still I

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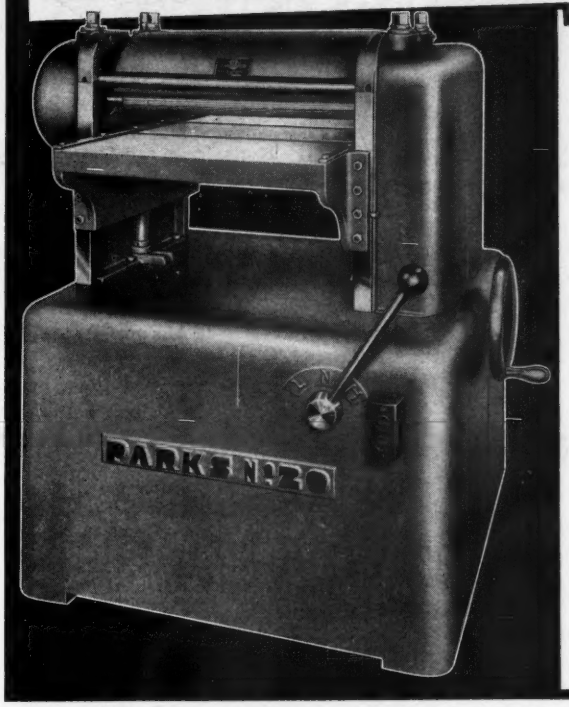

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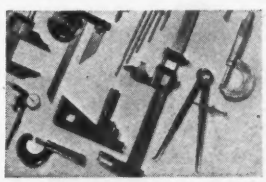

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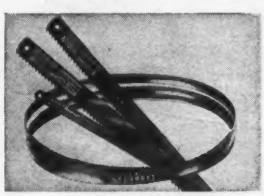

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don't find that the additional time required for this detailed checking is objectional, because the time saved in the checking of other phases of the drawing can then be used so much more effectively to check dimension irregularities as well as guide the overall learning of the individual.

The device does not supplant but supplements one's regular checking technic. By using the device I find that I can not only check drawings more thoroughly in the time allotted but also aid the student more adequately in planning his work and guide his learning activity.

In lieu of a checking device, I wonder what Mr. Stintsman uses or advocates.

LEONARD E. LARSON,
Denby High School, Detroit, Michigan.

NEWS

What's Doing in the Field of INDUSTRIAL EDUCATION

Illinois Workshops

TWO-WEEK summer workshop conferences will be held in Illinois again this summer for vocational teachers. Last year successful programs were held for machine-shop and building-trades teachers. This summer conferences will be held for teachers of these two subjects plus instructors in auto mechanics, electricity, and drafting. The conferences will be held simultaneously from August 16-27 at the University of Illinois. Emphasis will be on course-of-study development.

N. Y. Certificate Change

TEACHERS of shop subjects must have at least a high-school education before a certificate will be granted in New York State under a new ruling of the Board of Regents. Sixteen semester hours of posthigh-school credit will be given toward a degree for trade experience.

Georgia Vocational Conference

THE first annual conference of the Georgia Vocational Association will be held on June 10-12 in Macon. Mrs. Jean C. Westbrook of Macon, president of the association, reports that there has been a tremendous growth in vocational education because of the acceleration of industrial activity in the state.

GM Auto-Mechanics Institute

GENERAL MOTORS INSTITUTE, central training agency for General Motors, has announced the continuation of its auto-mechanics teacher-training program in two sections for the summer of 1948. The courses will run from June 21 to July 17 and from July 19 to August 14. Further information may be secured from the Registrar, General Motors Institute, Flint, Michigan.

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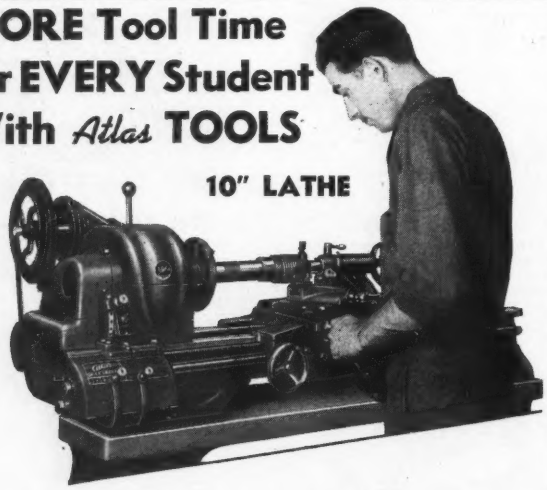

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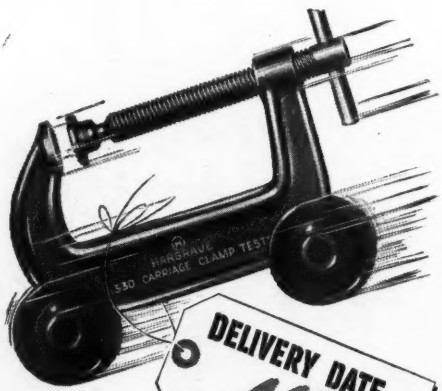

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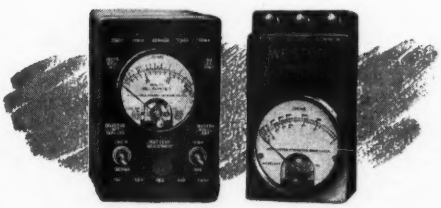

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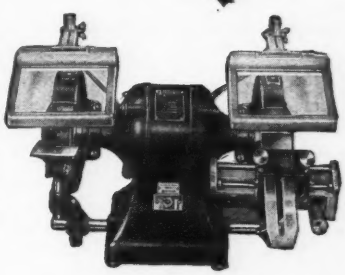

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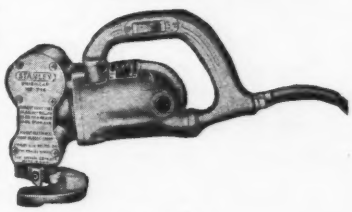

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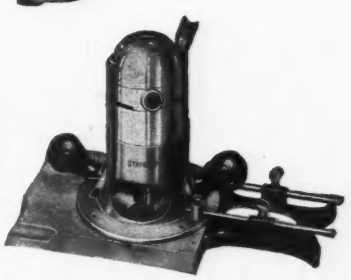

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Mail Box . . . *from page 7*

tallow or lubricating oil to prevent blistering. Remove all traces of grease and abrasive from the buffed surface with kerosene and finish buffing the surface with a clean loose-flannel wheel.

The letter slot is produced by drilling a series of holes on the center line and removing the remaining waste with a coping saw and file. A great deal of care must be exercised in drilling thin pieces of plastic. Exert just enough pressure on the drill to keep it cutting, have a good flat backing to prevent the piece from pinching the drill, and keep the drill point clean.

A form will be necessary for shaping the body. This can be made up of tin plate or galvanized iron. Shape the form to the contour of the top in the drawing. All forms for shaping softened plastic must be covered to prevent marring the surface. Flannel makes an excellent covering for forms as does billiard felt or thin rubber sheeting.

All surfaces adjoining the cemented joints should be carefully masked with Scotch tape to prevent the cement from flowing onto the surface. My favorite cement for this work is a mixture of Plexiglas shavings and ethylene dichloride. The density of the cement can be controlled easily by simply adding more shaving or more solvent. When penetration is desired, the cement should be rather thin. Allow a full day of drying time before removing the tape or doing any further work on the project. Many good joints are weakened by being too hasty about working on the project.

The hinge should have approximately 1/32" clearance between the mating parts. Hole locations for fastening the hinge were purposely omitted as the instructor may choose to use short sheet-metal screws in place of rivets. Extreme care is a necessity when riveting metal parts to plastics. Too much swelling of the rivet shank will crack the material. A 2-S aluminum rivet, headed just enough to give a good bearing surface, will prove satisfactory.

You may choose to stencil your name on the surface of the mailbox. Good results can be produced by masking the surface and then cutting the letters out with a scalpel or razor blade. Apply the desired dye or paint to the stencil and permit to dry thoroughly before removing the tape stencil. Lacquers of the resinous-base type containing hydrocarbon thinners can be used successfully on Plexiglas.

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Door	1/4" x 4-7/16" x 4 3/8" Plexiglas
Top	1/4" x 4 1/2" x 4 1/2" Plexiglas
Body	1/16" x 12" x 13" Plexiglas
Lock	1/8" x 3/4" x 1 3/4" Plexiglas
Support	1/4" x 1 1/2" x 1 3/4" Plexiglas
Hood (Sides)	1/8" x 1 3/4" x 5 3/4" Plexiglas (2 pieces)
Hood Cap	1/8" x 1 1/4" x 1 1/2" Plexiglas
Key	3/32" x 3 1/2" Copper-coated steel wire
Hinges	.031 x 7/8" x 3 1/2" (2 pieces) 2 S Aluminum Alloy
Hinge Pin	3/32" x 3 1/2" steel wire

Procedure

1. Lay out all parts of plastic as per drawing.
2. Saw away waste with fine-tooth bandsaw or coping saw.
3. File all parts to the finish line.
4. Drill holes for letter slot on body and remove remaining waste with coping saw and file.
5. Drill holes and finish slot on lock to receive the key.
6. Drill 1/4" holes on the back.
7. Sand all filed edges as per information on sanding.
8. Buff all edges to perfect clarity.
9. Heat the body in an oven at 225°F until thoroughly softened and shape over form. Shape must match top piece perfectly.
10. Mask and cement body to back. The back is set into the body.
11. Mask and cement support to the door. This piece is placed on the center line and matches the curved edge. Its purpose is to give thickness to the door where the key needs support.
12. Mask and cement top to the body and back.
13. Mask and cement hood over letter slot. Space the sides of the hood equally from the edges of the slot.
14. Mask and cement lock in position. Place the bottom edge of the lock 1/4" from the bottom edge of the box on the inside of the curve. The ends should be rounded slightly to give more surface contact.
15. Drill 7/64" hole on door as per drawing.
16. Make hinge as per drawing.
17. Remove all masking tape from job.
18. Fasten hinge to back and door.
19. Shape the eye of the key. Insert key into hole on door before making the 90° bend and cut off excess which permitted necessary adjustment.
20. Stencil with dye or paint if desired.
21. Wash entire job with mild soap and water.
22. Wax and polish with clean soft cloth.

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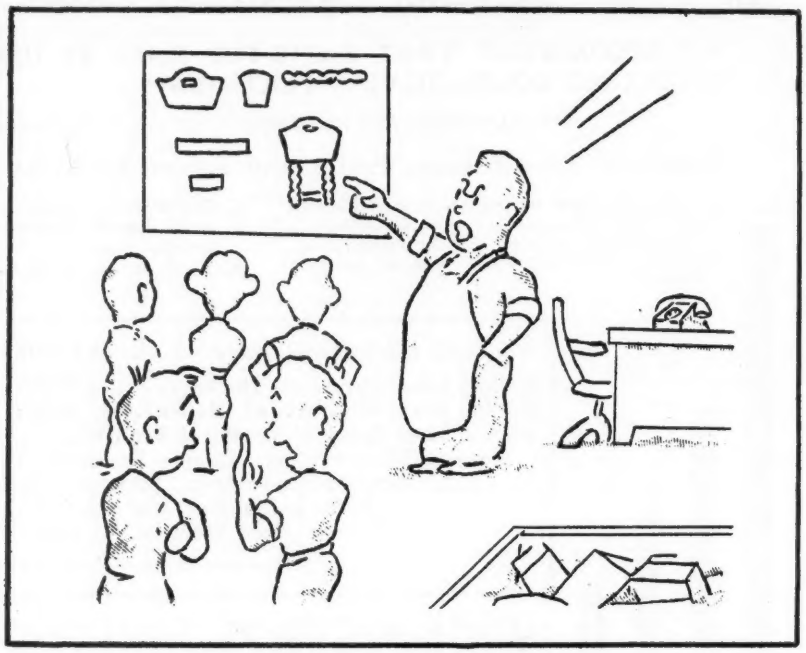
Leaders (?) in Industrial-Arts Education

By Marcus Fitzgerald

Permanent Stonewall



"Wait till Mom gets a load of this. Each of my three brothers took this course."

PERMANENT Stonewall has some characteristics which make him the antithesis of Alteration Bill who was described last month. Permanent Stonewall once read the slogan "build with brick for permanence" and drew an analogy for education. He proceeded to develop an industrial-arts course of study with one eye on keystone operations and the other eye on his retirement date. He organized a course of instruction with the flexibility of Gibraltar. He then spent hours and days making each project in its step-by-step sequence and mounted these project breakdowns on plywood which he hung around the room.

When the job was done, Stonewall looked at his creation and pronounced it good. He also declared it unchangeable.

Organization and preplanning on the part of the teacher are highly commendable, but when carried to the extreme, they preclude optimum pupil learning as well as teacher growth. Education is dynamic, not static.

OAKLEY FURNEY, assistant commissioner for vocational education, New York State Education Department, retired on March 31 and ARTHUR K. GETMAN, chief of the Bureau of Agricultural Education, has been named assistant commissioner. . . . M. J. RULEY has succeeded the late R. H. ROBERTS as director of industrial arts and vocational education, Tulsa, Okla., schools. GEORGE I. MARSH, director of vocational education, Fort Worth, Texas, schools, succeeds Mr. Ruley as director of adult education and coordinator of diversified occupations training at Tulsa. . . . JOHN J. BERILLA, teacher of industrial arts at the Phillipsburg, N.J., High School and long active in the affairs of the New Jersey Vocational and Arts Association, died on March 1. . . . JOHN M. LESLIE, formerly of the Air Force Technical Training Command, has been appointed senior educational supervisor for junior aviation, New York State Education Department. . . . BRUCE BELL, director of vocational education, East Chicago, Ind., schools, died recently. . . . FRANCIS LYNCH has been named director of industrial arts, Reno, Nevada, schools. . . . LEWIS W. YOHO, Oliver Junior High School, South Bend, Ind., has been named to the faculty of Ball State Teachers College, Muncie.

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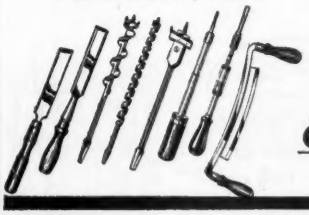

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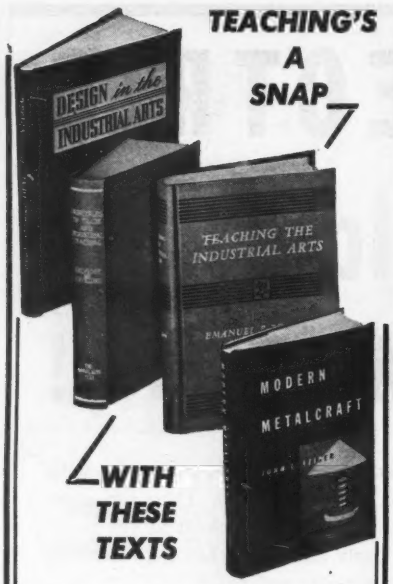

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Drawing board extension in use. Note that it is held to the board by thumbtacks which may be easily moved to alter the position of the device.

Drawing Board Extension

BY *Arthur F. Schuster*

Students can readily make this handy device in the woodworking shop. Arthur F. Schuster teaches at the Gaskill Junior High School, Niagara Falls, N. Y.

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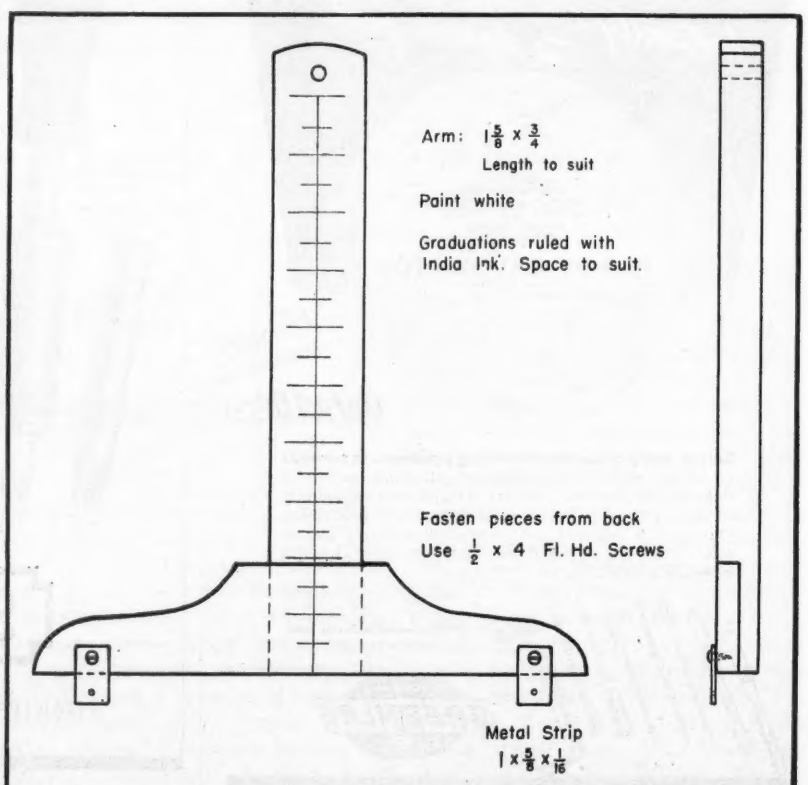
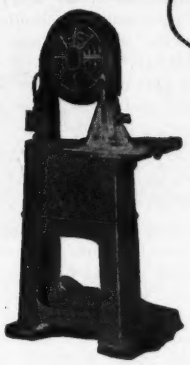
The drawing gives the necessary construction information while the photograph shows the application of the device.


Arm: 1 5/8 x 3/4
Length to suit
Paint white
Graduations ruled with India Ink. Space to suit.
Fasten pieces from back
Use 1/2 x 4 Fl. Hd. Screws
Metal Strip
1 x 5/8 x 1/16

FOR ACCURATE BANDSAWING!



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Instructional RESOURCES

Layout. Felten. 250 West 57th St., New York 19, N.Y.: Charles J. Felten, 1947. Pp. 132. $5.00.

Teachers of printing will find this excellent book to be of real help with advanced students of typography and design. Technics are covered for planning, designing, and producing all types of printed matter. Application is made of basic principles of design. Patterns and procedures are carefully covered in detail for all types of layout work. Hundreds of sketches and photographs illustrate the text. The experienced as well as the apprentice typographer will find much of help and inspiration in this volume.

Woodworking Crafts. Van Tassel. New York: D. Van Nostrand Co., Inc., 1947. Pp. v+194. $2.75, trade ed.

Intended for beginning students in woodworking, this book covers whittling, coping-saw work, squaring stock and elementary joinery, inlaying and veneering, wood carving, and wood turning. A series of basic projects accompanies each section of the book. Materials and tools to be used are discussed in each section and processes are described in detail. A variety of projects is offered in each stage of difficulty so that all students need not do the same projects to learn the same skills. Many helpful designs and photographs show processes and plans.

Raymond Van Tassel is an instructor in the School of Education, New York University.

Practical Descriptive Geometry. Rusinoff. Chicago: American Technical Society, 1947. Pp. ix+259. $3.50

Practical applications of the principles of descriptive geometry characterize this book which will be of particular interest to teachers of trade-extension classes. The text shows how descriptive geometry is used in the automotive, machine-tool, aviation, and steel industries as well as in related fields.

The first two chapters give a condensed picture of engineering drafting. Emphasis is placed on the correlation of orthographic drawing and descriptive geometry. Subsequent chapters apply the principles of descriptive geometry in the designing and assembling of machines and parts.

The last chapter covers the solution of miscellaneous problems and useful tables in the appendix give sufficient data to solve many different problems.

S. E. Rusinoff is associate professor of mechanical engineering at the Illinois Institute of Technology and has had many years of experience as a design engineer in the industrial field.

Airbrush Illustration. Harris. Peoria, Ill.: The Manual Arts Press, 1947. Pp. 78. Illus. in color. $4.00.

Airbrush Illustration is a comprehensive treatment of the subject from the details of getting started to the carrying out of difficult color assignments. The authors have had a successful career in commercial work including such diverse types of jobs as magazine covers, advertising display pieces, and textbook illustrations. Step-by-step procedures are shown for both black-and-white and color work. A chapter is also devoted to photo-retouching, the backbone of airbrush art.

Ben Jorj Harris are a man-and-wife team of illustrators, specializing in airbrush work, who both work on most of their drawings.

SPI Handbook. New York: Society of the Plastics Industry, 1947. Pp. xxx+451. $4.50 to members; $7.50 to nonmembers.

Shop teachers interested in the molding and forming of plastics will find this to be an invaluable compilation of technical data. The material for this volume was gathered during the war when the armed forces requested the plastics industry to compile extensive data on the strength of plastics so that they could be utilized in war materiel. Over 300 technicians worked on the project. Topics covered are indicated by the following chapter headings: classification of plastics molding materials; molding and forming plastics parts; design of molded articles; design standards for inserts —their application in plastics parts; standards for tolerances on molded plastics parts; cementing and assembly of plastics; testing plastics parts; mold design and recommended steels; machining and finishing plastic parts; and laminated products and their fabrication. Numerous drawings, photographs, and tables add clarity to the presentation.

What to Make for Children. Chicago: Popular Mechanics Co., 1947. Pp. 110. $2.50.

This is a collection of 175 projects which can be made for small children. While designed primarily to interest home craftsmen, the items in this book could be adapted for industrial-arts purposes.

FM Transmission and Reception. Rider and Uslan. New York: John F. Rider, Publisher, Inc., 1948. Pp. vi+409. Paper bound, $1.80; cloth bound, $2.70.

The authors have presented in this book an inclusive treatment of the subject of frequency modulation. The book is divided into two parts with the first devoted to transmission and the second to reception. In the first part, the underlying theory of f.m. and p.m. is included as well as the propagation of f-m signals, the basic characteristics of f-m transmitters, and an analysis of transmitters in use today. It also includes a discussion of the latest in transmitting antennas.

The second half of the book covers f-m receiving antennas and the f-m receiver. The four types of detectors in use today are discussed in detail: the limiter-discriminator type, the ratio detector, the oscillator detector (locked-in oscillator), and the FreModyne detector. The last part of the section is devoted to the alignment and servicing of receivers.

Employment Outlook in Machine Shop Occupations is a current report prepared by the Bureau of Labor Statistics of the U. S. Department of Labor. It summarizes the excellent employment possibilities in the field and will be of particular interest to counselors and machine-shop teachers. Available from the Superintendent of Documents, Washington 25, D.C., for 20 cents.

For the Greatest Good is a pamphlet produced by the Office of Vocational Education, Michigan State Department of Public Instruction, Lansing, which portrays for the public the objectives of vocational education. Printed in two colors with numerous illustrations, the publication is written in nontechnical language. While some of the facts pertain to Michigan alone, administrators will be interested in the attractive method of presenting the need to the public for vocational education.

Handwrought Silver is a 16mm color motion picture showing the work of the silversmith. It was produced as the result of the first national Silversmithing Workshop Conference for teachers held last August at the Rhode Island School for Design. Further information may be secured from the producers, Handy and Harman, 82 Fulton Street, New York 7, New York. Please mention SCHOOL SHOP.

Radio Frequency Heating is a 16mm technicolor sound motion picture with a projection time of 40 minutes. Produced by Westinghouse, it covers, in the first part, the theory of induction heating with easy-to-understand animation. Illustrations are then given of induction heating for soldering, brazing, annealing, and hardening. The second section deals with the theory of dielectric heating, followed by a description of applications in such fields as laminating wood, preheating plastic preforms, etc. Available free, except for transportation, from the School Service, Westinghouse Electric Corp., P. O. Box 1017, Pittsburgh 30, Pa. Please mention SCHOOL SHOP when writing.

From Forest to Fireside is a 16mm sound film in color of the origin, conversion, and eventual use of the products of the Ponderosa pine. Logging operations, activities in a sawmill town, lumber research work, and utilization of lumber in building are shown. Running time is 35 minutes. Produced by the Denver & Rio Grande Western Railroad in collaboration with the Western Pine Association. It is available from the latter on a free-loan basis except for shipping charges one way. Write the Western Pine Association, Yeon Bldg., Portland 4, Ore.

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Aircraft Electrical Systems, Hydraulic Systems & Instruments *Spring, 1948*

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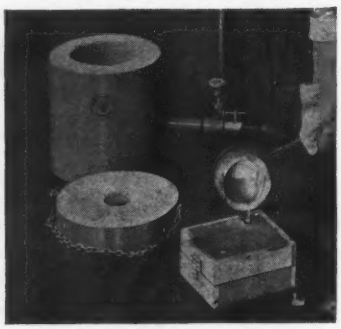


Foundry Junior, a small melting furnace complete with all equipment and tools necessary to produce sand and plaster mold nonferrous castings, has been announced by the Sawyer Bailey Corporation, Buffalo, N.Y.

The complete unit consists of furnace, crucibles, tongs, crucible holder, skimming and stirring rods, asbestos gloves, and goggles. The molding equipment consists of a special grade foundry sand, flask, riddle, rammer, and all other necessary tools.

The furnace shell is of welded steel construction, lined with the highest grade refractory and capable of operating at a temperature of 2400°F. The cover is of the same refractory and is reinforced with steel bars. The furnace will hold crucibles having a working capacity of 10 lbs. of aluminum or 34 lbs. of brass or bronze. The company has available numerous casting alloys and supplies adaptable to model building and experimental casting. For complete information, write Sawyer Bailey Corporation, 785 Hertel Ave., Buffalo 7, N.Y.; *or check no. 42 on the coupon.*

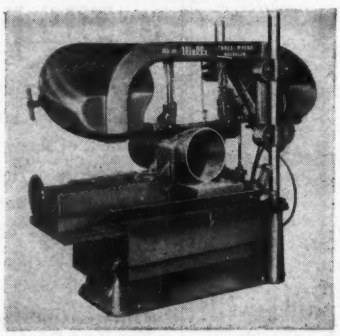
Wildberg's Rapid-Flo Flux

An improved type of soldering flux, known as Wildberg's Rapid-Flo flux, has just been introduced to make the most difficult soldering operations easier for all classes of operators, including skilled workers, teachers, students. The new flux is suited for working with brass, stainless steel, monel metal—in fact, with all ferrous and nonferrous metals except aluminum.

Among the many advantages of Rapid-Flo soldering flux are the following: It meets the most rigid government specifications; it is active from 200 to 300 degrees below the melting temperature of silver solders, allowing time for the flux to absorb all oxides and keep its protective properties up to 1850°F., thus giving a safety margin of protection of 250° against oxides formed on overheated parts; it reduces "stress" and "voids" through development of stronger bonds. There is no flare during soldering and blazing. Clear composition allows visual inspection of joints through the solder.

For complete information as to availability, write Wildberg Bros. Smelting and Refining Co., Dept. G, 742 Market St., San Francisco, Calif.; Dept. G, 635 S. Hill St., Los Angeles 14, Calif.; *or check no. 43 on the coupon.*

Wells Band Saw Available with Wet Cutting System



The new Wells No. 12 heavy duty metal cutting band saw, with automatic cutting cycle and electrically controlled blade pressure, recently announced by the Wells Mfg. Corp., Three Rivers, Michigan, is now available with a complete, self-contained Wells cutting system.

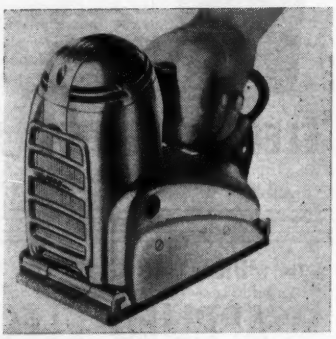
The system which is installed as an integral part of the saw includes a chip pan, fluid tank, centrifugal type pump-motor unit, splash guards, and protective screens. Working capacity of the system is three gallons of fluid. Experience in the use of a similar system in conjunction with the smaller Wells No. 8 saw has proved that the system permits safe use of higher f.p.m. cutting speeds and increases blade efficiency. Further information may be obtained from the Wells Mfg. Corp., Three Rivers, Mich.; *or by checking no. 44 on the coupon.*

New Boice-Crane 14" Band Saw

The new Boice-Crane 14" band saw's steel-clad design affords maximum safety. Top rating has been given it by state safety commissions. Tests prove that the Boice-Crane band saw saws from two to four times more lumber footage in a given time than other 14" band saws and averages three times faster work to make tremendous savings in time, labor, and money. All mechanisms, motor, etc., are fully enclosed. No cross-arms or exposed moving parts. The blade tension is calibrated for all widths.

A new brochure describing the Boice-Crane 14" band saw, just off the press, is available to shop teachers. Filled with pertinent facts regarding the various models and accessories, this interesting folder fully describes and illustrates this popular saw. Write for a copy to Boice-Crane Co., 938 W. Central Avenue, Toledo 6, Ohio; *or check no. 45 on the coupon.*

New Features for Sterling Sander



New side housing fenders, now standard equipment and a basic part of all Sterling sanders, prevent scuffing when sanding in close quarters and give added protection to the transmission. An air-scoop accessory gives protection in extremely wet or dusty sanding operations. Another accessory, just introduced, is an auxiliary handle or knob which easily attaches to the top of the housing on the Sterling sander. This gives added support when an operator is sanding vertical or overhead surfaces for long periods of time.

For additional information or descriptive literature write Sterling Tool Products Co., 1340 N. Milwaukee Avenue, Chicago 22, Ill., mentioning SCHOOL SHOP; *or check no. 46 on the coupon.*

The J. D. Wallace "Equalizer"

A new attachment has been introduced by J. D. Wallace & Co. to fit their 8" jointers, increasing the width of material that can be planed on these machines from 8" to 16".

The attachment is called an "equalizer" and consists of a heavy steel bar bolted in the rabbet ledge. This bar is fitted with an adjusting screw so that the end adjacent to the cutterhead can be adjusted tangent with the cutting circle of the knives. For installation on old machines the manufacturer supplies a simple fixture with drill and tap for spotting the mounting holes. For complete information write J. D. Wallace & Co., 170 S. California Ave., Chicago 12, Ill.; *or check no. 47 on the coupon.*

Each item listed above is numbered. Check the numbers of the items you want, and mail the coupon, properly filled in, to . . .

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Student projects can be planned to cover a wide range of applications with the C-B Manual Metal Shrinker.

This is the same tool that is used in industry for quick-forming many specialized metal parts.

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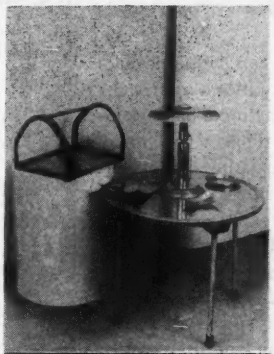

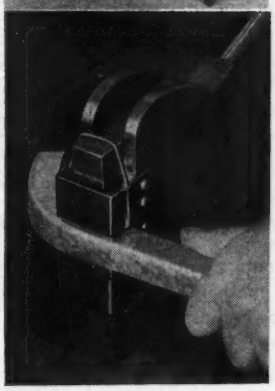

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Washington . . . *From page 32*

the more than 200 occupations in which relatively few apprentices are employed in any one state.

In general, also, it can be said that there is little uniformity in the approach or content of the instructional materials which various states prepare; and only a limited amount of existing materials can be used for home study or itinerant teaching.

What has the federal government done so far to help with this problem? The federal Division of Vocational Education has assigned a special staff to work with the states in spotting available materials prepared locally and informing school officials where these materials are and how they may be obtained. So far, the Vocational Education Division has published three mimeographed lists containing references to state-prepared materials available to those who need them. This inter-state exchange of materials has been of appreciable help to apprentice officials.

Is this a satisfactory method of meeting the nation-wide need for instructional materials? It helps, but it is not the best answer. For one thing, state distribution of materials for national use works undue hardships on the existing staff, facilities, and budgets of the states.

Would the full amount of the George-Barden authorization help the states to do a better job in materials preparation? It would. That, in turn, would aid the nation's apprenticeship programs. Consequently, our entire industrial resources would be strengthened.

Aside from promoting exchange of locally-prepared instructional materials, what else does the federal government plan to do? First, it plans to push more vigorously the preparation of materials in those occupations for which little exists today. In February, for example, the Vocational Education Division, working with state and local trade educators, asked the state boards of education to prepare supplementary technical instruction outlines for apprentice training in occupations "which at the present time do not appear to have adequate outlines available for the use of teachers and supervisors."

Even though these outlines are skeletal in nature, they will represent an important effort to unify procedures for outlining courses and to focus attention on those trades and industries not previously analyzed. Once ready, these outlines should make the development of content for student use less difficult.

Has there been much response to this invitation to develop outlines? Some. Greater response will be needed.

And what lies beyond? After the outlines are prepared, there will have to come another effort—that of preparing the teaching and learning instruments, themselves. Here is a new challenge for the nation's vocational educators to meet. No one doubts that it will not be met.

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Crystal Ball . . . . . *from page 6*

quite thoroughly to older age or upper-grade level pupils.

The teacher-education institutions were alert to this need and encouraged and in some instances required the students to specialize in one or more areas of shopwork in addition to developing the capacity to conduct a comprehensive general shop program. The results were gratifying in those schools where the industrial-arts teachers possessed a high degree of competence and where the equipment was appropriate for advanced instruction.

Teaching became more highly professionalized during the period immediately following World War II. Teachers were expected to be more resourceful and better informed. They were expected to be able to participate effectively in curriculum and evaluation studies and in guidance programs, regardless of their subject field. Industrial-arts teachers were no exception.

At first industrial-arts teacher educators resisted the pressure, insisting that there was not sufficient time to cover the subject matter of industrial arts and still have an opportunity to meet the additional demands. However, a series of significant studies was conducted from 1950 to 1958 under the sponsorship of a national organization to find more efficient means of teacher education. The recommendations resulting from the research were numerous and included the following:

1. Make college-level subject-matter courses as professional as possible. College courses should be just as sound sociologically and psychologically as secondary-school programs are expected to be.

2. Improve the quality of instruction on the college level. There is no justification for offering an insipid course in "tests and measurements" when the same time could be spent in a genuine treatment of how to evaluate pupil growth and development in terms of clearly formulated educational objectives. Similar recommendations apply to conventional guidance courses, introduction to education courses, and, above all, to practice teaching programs.

3. Provide for a teaching internship. Teaching is the only profession wherein the neophyte assumes a full load and full responsibility the moment he enters the practice.

4. Develop exemplary programs so as to break the cycle of perpetuating the status quo. Certain schools and teachers should be urged to get as far ahead as possible in their program development. It is by having such centers for practice teaching and observation that teacher-education institutions can prepare their students to conduct educationally defensible programs.

More drastic changes in education and in industrial arts did not come until the early sixties when the profession, led by well-intentioned, superbly qualified teachers insisted on a reassessment of the entire public education program in America.

I closed Fitzgerald's history book with a feeling of profound gratitude to the author. After completing my study I walked past the crystal ball establishment on J Street. As I did so I said to myself, "Crystal gazing certainly has no place in education."

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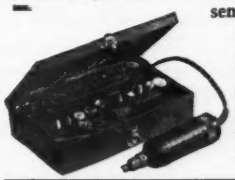

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FROM WASHINGTON

BY MICHAEL PACA

WILL Congress provide the full $29,301,000 for vocational education as authorized by the George-Barden Act? There is today a better than even chance that this may happen. In February, the House appropriations committee decided to grant only $19,842,000 for the next fiscal year. But toward the end of March Assistant Commissioner for Vocational Education Gregory made a strong plea before the Senate appropriations committee that the lopped-off $9,400,000 be restored.

Did Dr. Gregory use any new arguments to justify his request? He did. One argument of especial interest to trade and industrial workers centered on the need for improving apprenticeship training. Another argument dealt with the fact that states are planning to set up 1047 new departments of vocational agriculture in rural high schools to offer instruction in agriculture to some 107,000 rural people who do not now have it. Dr. Gregory also said that if the full authorized amount is not made available the guidance program contemplated under the George-Barden Act may not be developed, or the amount that would go for reimbursement to local schools for the cost of instruction will have to be reduced.

Will these arguments have any effect on Congress? The one dealing with improved apprenticeship training may. Congress has a healthy respect for apprenticeship training. As Rep. Keefe of Wisconsin recently said: "I want the record to show that apprentice training bears no relationship to the so-called quickie programs of training we indulged in during the war. This (apprenticeship) is an official, solid program designed to provide the country with skilled journeymen . . ."

Where do the public vocational schools come in? The public school's role in apprenticeship is to provide related instruction. The cost of developing suitable instructional materials and hiring qualified teachers for apprentice groups, Dr. Gregory told the Senate appropriations committee in his plea for the full George-Barden amount, is taxing the ability of vocational schools to discharge their responsibility for aiding apprenticeship training.

How serious is the problem of providing related instruction for apprentices? It is very serious. Only a few of the large manufacturing concerns offer related instruction in addition to the primary training on the job. For the most part, providing related instruction has been delegated to the public vocational schools.

The number of apprentices is growing. In 1946 there were only about 63,000 registered apprentices. Today there are more than 200,000. In addition, there are probably 100,000 other apprentices training in a variety of local programs for whom related instruction should be provided.

The number of apprenticeable occupations is also growing. The public vocational schools are traditionally equipped to offer related instruction in only about 30 or 40 occupations. Today, there are about 290 occupations approved by the federal government for which related instruction should be offered, and many more occupations not approved by the federal government.

Should the public vocational schools offer related instruction to all these apprentices in all their various pursuits? They should try to reach as many as they can. Ideally, public schools should see that each apprentice receives individualized instruction in the technical knowledge and information required in the performance of his trade; facts dealing with the background of his trade, its ethics and human-relationship problems; and fundamental knowledge (science, mathematics, drawing, etc.) needed in the trade.

What do the schools need to do this job right? Above all, they need well-planned, uniformly organized and clearly written study guides that are largely self-administered by the student. They also need guides for teachers.

Why the emphasis on "self-administered" study materials? Because it is necessary to reach the apprentice where he lives and he is often to be found in smaller towns and in communities "isolated" from public vocational schools. Some of the smaller towns have neither materials nor teachers to serve apprentices. Or, the instructional facilities may be restricted to traditional apprenticeships — carpentry, printing, etc. Self-administered student instructional materials would help both in cases where the student can carry on home study or do his studying under supervision of an itinerant teacher.

What is the current status of the supply of related instructional materials? At the present time the states and local school systems prepare their own materials with their own resources. The results are not adequate because many states do not have expert help to prepare these teaching and learning aids. Then, too, the state and local communities naturally focus attention on those occupations in which large numbers of apprentices are employed. The result is a great gap in instructional materials in

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